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THE

SALMON AND SALMON FISHERIES OF ALASKA.

REPORT OF THE OPERATIONS OF THE UNITED STATES FISH COMMISSION STEAMER ALBATROSS FOR THE YEAR ENDING JUNE 30, 1898.

By JEFFERSON F. MOSER,
COMMANDER, UNITED STATES NAVY, COMMANDING.

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FALLS IN STREAM AT SKOWL ARM, KASAAN BAY, SOUTHEAST ALASKA.

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INTRODUCTORY.

The following report of the operations of the steamer *Albatross* and party under my command for the fiscal year ending June 30, 1898, is respectfully submitted:

In order to cover in one report the work of the summer of 1897 it will be necessary to refer to the time of the arrival of the party in the field, a date earlier than June 30, 1897, the time of closing my previous report.

While the *Albatross* was engaged in setting deep sea gill nets along the edge of the Pacific plateau for the purpose of ascertaining, if possible, the sea salmon-grounds, instructions were received, under date of April 23, 1897, directing the vessel to visit Alaska, for the purpose of investigating the salmon and halibut fisheries.

Under these instructions, modified by subsequent experience, the plan of work for the investigation of the salmon streams and the salmon industry of Alaska was laid out as follows: To commence at the southern boundary and work in detail to the northward and westward, visiting all canneries and all streams carrying commercial salmon, whether fished or not; to obtain at the canneries statistics of streams fished by them, reaching over as many years as the records would furnish data, and, in addition, detailed statistics regarding the persons, vessels, boats, and apparatus employed in the fisheries, together with the catch and pack of the various species of salmon; to explore the streams and lakes and ascertain the general features and characteristics, so far as they relate to salmon and other fishes, spawning-grounds, condition and nature of the water, character of shores, vegetation, species of salmon entering, their movements, time and duration of runs, size of fish, abundance, waste species, signs and causes of depletion, the mortality of the different species on the spawning-grounds, natural and artificial obstructions to the passage of fish, fishing methods and their relation to the maintenance of supply, data relating to conditions for hatcheries, etc.

In connection with the studies of the salmon industry it was decided that the halibut-grounds could be examined and practical information obtained as to their location, depth, extent, the abundance and size of the fish, the proper bait, and other points.

The detail of the vessel to proceed from Sitka to Bering Sea on special duty caused the abandonment of the original scheme of proceeding systematically from the southern boundary to the northward, as it was thought advisable, after fulfilling the mission referred to, to examine the salmon fisheries along the Aleutian chain and work from the westward, instead of returning to southeast Alaska and continuing the work to the northward. By making this change all the canneries in operation in Alaska, outside of Bering Sea, and many of the streams were visited. There are, however, so many streams in the Territory, particularly in what is known as southeast Alaska, that, while the party has covered a great area and has now a thorough acquaintance with the subject, the work so far as it relates to stream and lake exploration has only been commenced.

The *Albatross* arrived at Mary Island, southeast Alaska, June 6, 1898. and pursued the following itinerary during the investigation:

Mary Island, southeast Alaska	June 6
Boca de Quadra	June 7-8
Ketchikan, Tongass Narrows	June 9-10
Port Chester, Annette Island	June 10-12
Nichols Bay, Prince of Wales Island	June 12-14
Hunter Bay, Prince of Wales Island	June 14-22
Niblack Anchorage, Prince of Wales Island	June 22-24
Chasina Anchorage, Prince of Wales Island	June 24-25
Karta Bay, Prince of Wales Island	June 25-28
Kasaan Bay, Prince of Wales Island	June 28
Loring, Naha Bay	June 28-July 2
Yes or McDonald Bay, Cleveland Peninsula	July 2-3
Helm Bay, Cleveland Peninsula	July 3
Thorne Bay, Prince of Wales Island	July 3-6
Point Highfield, Wrangell Island	July 6-8
Duncan Canal, southern end	July 8-9
Killisnoo, Kenasnow Island	July 9-11
Sitka, Baranof Island	July 11-15
St. Paul, Kadiak Island	July 17
Karluk, Kadiak Island	July 18-20
Dutch Harbor, Unalaska	July 23-27
Chignik Bay, Alaska Peninsula	July 29-Aug. 2
Karluk, Kadiak Island	Aug. 2-6
Uyak Bay, Kadiak Island	Aug. 6-10
Little River, Kadiak Island	Aug. 10
Uganuk, Kadiak Island	Aug. 10-14
Kussilof River, Cook Inlet	Aug. 15-17
Port Etches, Prince William Sound	Aug. 17
Orca, Prince William Sound	Aug. 18-26
Yakutat, Yakutat Bay	Aug. 27-30
Sitka, Baranof Island	Aug. 31-Sept. 5
Redfish Bay, Baranof Island	Sept. 5-8
Klawak Inlet, Prince of Wales Island	Sept. 9-18
Killisnoo, Kenasnow Island	Sept. 19-21
Chilkat Village	Sept. 22-25
Point Highfield, Wrangell Island	Sept. 25
Loring, Naha Bay	Sept. 26-28
Ketchikan, Tongass Narrows	Sept. 28
Metlakahtla, Annette Island	Sept. 29
Seattle, Washington	Oct. 8-13
Tacoma, Washington	Oct. 13-24
Seattle, Washington	Oct. 24-25
Union Bay, Vancouver Island	Oct. 26-29
Sausalito, California	Nov. 2-Dec. 5
Farallon Islands	Dec. 5-6
Sausalito, California	Dec. 6-20
San Diego Bay, California	Dec. 22-31

Many of the points visited were unsurveyed, and existing sketches were found to be unreliable and inaccurate. In addition to the regular work connected with the investigations, many reconnaissances and sextant surveys were made, astronomical observations for latitude, longitude, and magnetic declination were taken, and hydrographic notes and sailing directions collated.

At Karluk, Kadiak Island, Mr. A. B. Alexander, fishery expert attached to the *Albatross*, was landed, to make inquiries concerning the extensive salmon fisheries of the Karluk River while the vessel was on her way to Unalaska. Mr. Alexander's report contains much valuable material on this subject, and is incorporated in the chapter on that region.

During the latter part of the season the progress of the work was much impeded by boisterous and stormy weather. The vessel arrived at Seattle, Wash., October 8. After docking the ship and making some minor repairs, San Francisco was reached November 2, where inquiries regarding their work were made among the officials of the various packing companies, the majority of those operating in Alaska having their main offices in San Francisco. On December 20 the *Albatross* proceeded to San Diego Bay to undergo a general refitting and overhauling. She was lying at this point at the outbreak of the Spanish war, when, by order of the President, she was detailed to the Navy Department for use as an auxiliary cruiser.

Before proceeding to the report of the investigations, I desire to express my appreciation of the work performed by the officers of the *Albatross*, and of the courtesies extended by those interested in the canneries. Lieut. L. M. Garrett, U. S. N., besides carrying on his duties as executive officer, made all the observations for geographical positions. Lieut. H. E. Parmenter, U. S. N., in addition to his duties as chief engineer, conducted the field work of nearly all the surveys and plotted the work. Lieut. J. P. McGuinness, U. S. N., conducted the field work of several surveys, but was mostly engaged in examining salmon streams and lakes. Ensign Yates Stirling, jr., U. S. N., was employed in stream and lake examinations and conducted the hydrography. Ensign S. V. Graham, U. S. N., assisted in the surveys. Mr. A. B. Alexander assisted in the stream and lake examinations, and Messrs. F. M. Chamberlain and H. C. Fassett assisted generally, both rendering valuable service in photography. All performed their several duties in a commendable and satisfactory manner. The Alaska Packers' Association furnished me with a letter to all their canneries, directing the superintendents to offer the *Albatross* every facility for conducting the inquiries and examinations. All the other canneries also extended every courtesy, and at no place were any obstacles placed in our way.

For convenience, the salmon fisheries of Alaska may be divided into five districts, as follows: First, or southeast Alaska district, from the southern boundary to Cape Spencer; second, or Prince William Sound and Copper River district, from Cape Spencer to Cape Elizabeth; third, or Cook Inlet district, from Cape Elizabeth to Cape Douglas; fourth, or Kadiak and Chignik district, from Cape Douglas to Unimak Pass; and fifth, or Bering Sea district.

Considering the pack of salmon from 1878 to 1897, the percentage of pack in the different districts, as averaged from the tables, is approximately as follows:

Southeast Alaska (Lower, 15.0; Upper, 8.2)	23.2
Prince William Sound and Copper River	6.6
Cook Inlet	6.5
Kadiak (35.7) and Chignik (8.1)	43.8
Bering Sea	19.9
	100

As the redfish is the commercial fish, the other species being packed incidentally, or to fill up the quota when other kinds are scarce, no attempt was made to examine streams other than those having the red salmon, except when detained, or in localities where no positive information on the subject could otherwise be obtained. Reliable information relating to the streams is difficult to secure. There are large areas where not a single person can be found, except during the fishing season. Many hours were spent in Indian villages, surrounded by bucks and "klootchmen," children and dogs, tracing the geography of the country on the sand and trying to ascertain where the salmon streams of the vicinity were located, but generally without much reward. Their names for the different species of salmon are conflicting, and their geography vague and confusing. The largest species in a locality is always a "tyee." In many places they call the redfish "coho," and when it was intimated that the name was usually applied to the silver salmon, a quiet smile has been seen to pass around, expressive of our supreme ignorance.

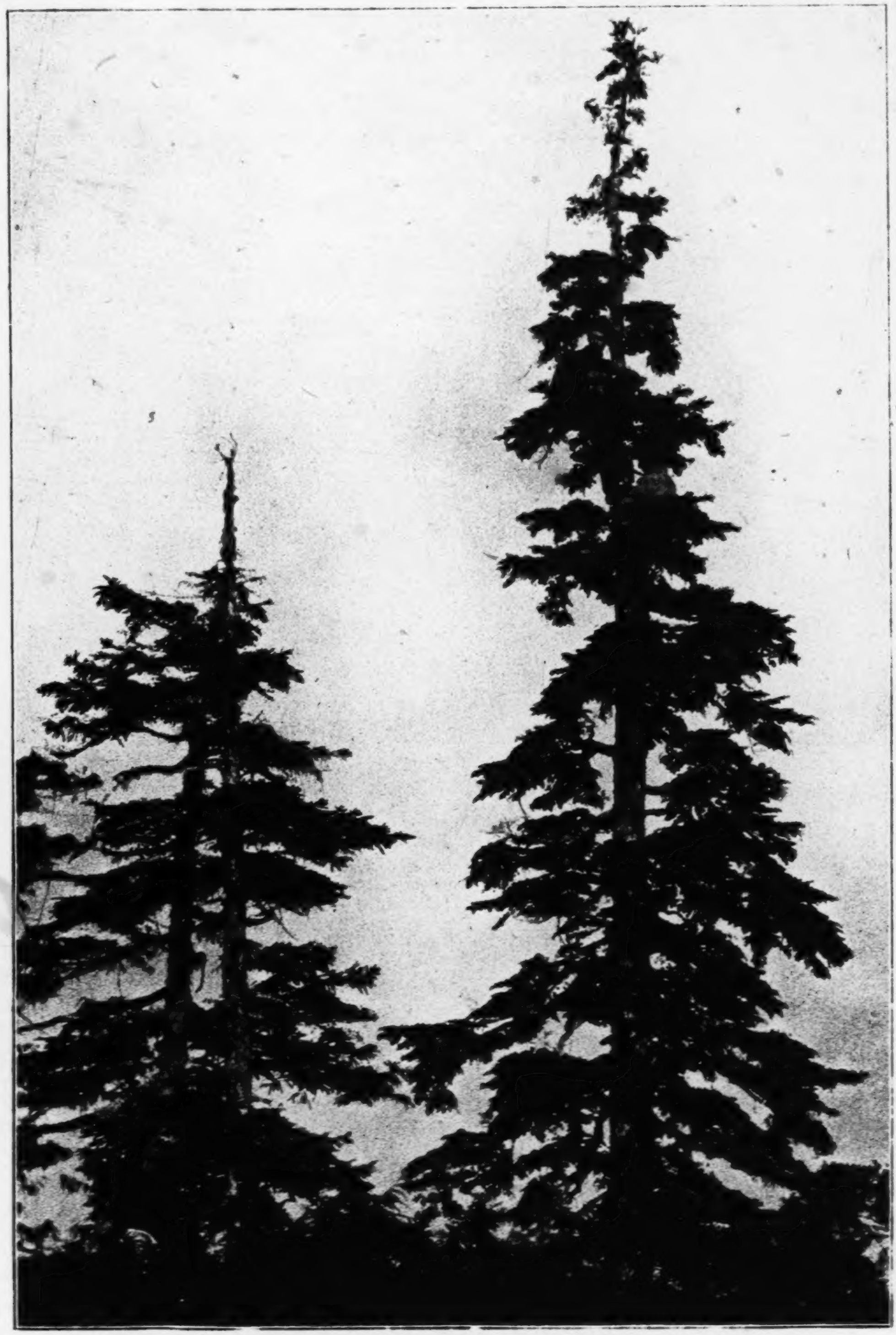
Even when white men are met and questioned, information relating to the streams is difficult to obtain with any degree of exactness. The men at the head of the canneries know the cannery business thoroughly. They know how to get the fish to the canneries, pack them, case them for the market, and figure on the profits, but it is exceptionally rare to find one who has followed even his home stream to its source and examined the lake system and the spawning-grounds. This is not said in a spirit of criticism, for the cannerymen are interested only in obtaining fish, but to indicate the difficulty of gathering the information desired in our work, except by personal examination and investigation.

As the work progressed it was soon learned by certain signs, and independently of any information except by examination, whether a stream carried redfish. A shack near the mouth of the stream, with some fishing gear and a canoe or two housed in, was one sign, but it sometimes failed. A barricade, or the remnants of one at high-water mark in the stream, was an infallible sign of a redfish stream. Another sign was the color of the flowing water; if clear, it was probably not a lake outlet, and carried no red salmon; if but slightly tinged, brownish, not unlike the juniper water of the Dismal Swamp, it was a lake outlet, and probably contained redfish, and possibly all the other species as well.

The exploration of these streams and lakes is not an easy task. The bed of the stream is the only highway, and this taxes endurance to the utmost, and, at the best, progress is slow. The current is generally strong, the river bed is full of pitfalls, and after an advance of a mile, climbing over bowlders, crossing rapids, clinging to the shubbery growing on the faces of precipitous rock walls, and tumbling through trees and over log jams, one feels that certain muscles have been called into play that have never before been known to exist. Practically no advance can be made on the banks; here and there deer trails can be followed, but they lead off away from the course and into the mountains. The forest itself is almost impenetrable, not only on account of the vegetable growth, but because the mass of fallen and decaying timber and its débris form obstructions that are very difficult to pass. The parties frequently returned to the vessel well-nigh exhausted, and in several instances men gave out while on duty.

In carrying on the investigations the importance of obtaining detailed records from the different streams was recognized, not only to determine their capacity, but to be able to trace injury caused by traps, barricades, overfishing, etc. In a few instances only are complete records available, and even in these cases the waste at the fisheries and the amounts taken for local consumption and for winter food are unknown. The masters of cannery steamers in calling at the different fisheries record the number from each locality in a notebook when the fish are bought, and the amounts are paid upon delivery at the cannery. If the fish are obtained at fisheries conducted by the canneries, no accurate account is kept by localities. When the season is over and settlement is made, these memorandum books are thrown away or lost. Besides, there are frequent changes of masters, steamers, and cannery superintendents.

The Alaska Packers' Association now have printed form books at each cannery operated by them, in which are recorded, for each day, the state of the weather and the number of each species of fish received at the cannery and packed, so that at present the number of fish handled at any one of their canneries can be learned. If accurate stream records could be kept, it would be of great value, not only to the Government in framing laws, but to the canneries themselves.

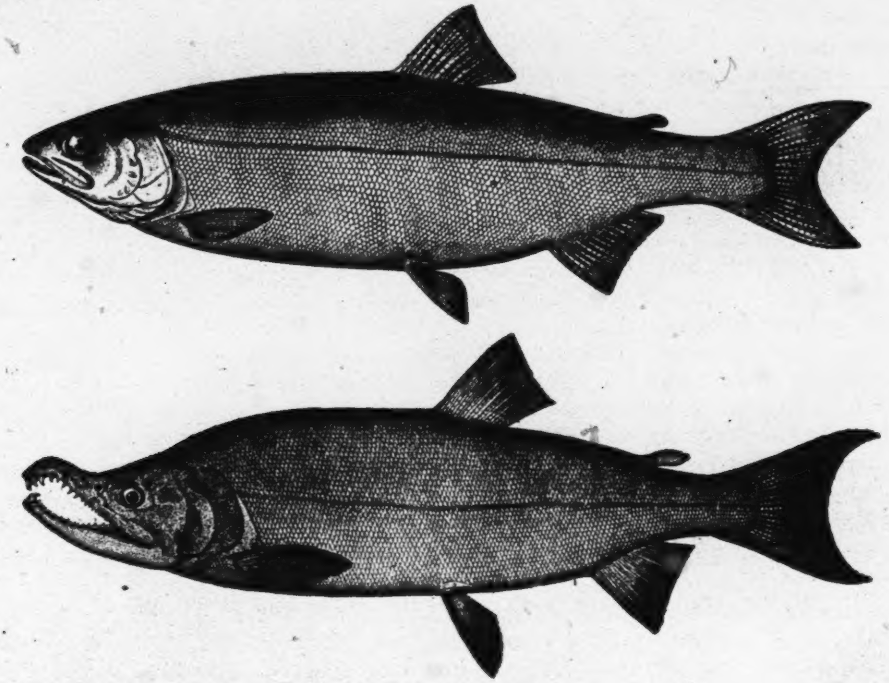


PHOTOGRAPHING UNDER DIFFICULTIES, NEAR LORING.

THE SALMON OF ALASKA.

COMMON NAMES.

The salmon packed in Alaska consists for the most part of the species called "redfish" in that region (*Oncorhynchus nerka*), and referred to in this report by that name. It is known in other localities as blueback salmon, Fraser River salmon, saw-qui, sockeye, or saukeye salmon, and krasnaya ryba. Four other species are also packed, but they form only a relatively small portion of the output. Of these the principal species is the humpback (*Oncorhynchus gorbuscha*). The next important species is the coho (*O. kisutch*), also called the silver salmon, skowitz, hoopid salmon, bielaya ryba, kisutch, and quisutsch.



THE RED SALMON (*Oncorhynchus nerka*).

(Upper figure represents fish before entering river for breeding; lower figure represents breeding male.)

The king salmon (*O. tschawytscha*), which is by far the most valuable species in the Pacific States, is comparatively insignificant in numbers in Alaska. It is known in other localities as quinnat salmon, chinook salmon, Columbia salmon, Sacramento salmon, tyee salmon, saw-kwey, chouicha, and tschavitche.

The dog salmon (*O. keta*) is the least important of all the salmon of Alaska.

There are some local variations of the common names. At Hunter Bay the king salmon (*O. tschawytscha*) is referred to as "spring salmon." At Wrangell the redfish

(*O. nerka*) is called "silver salmon," and the coho (*O. kisutch*) is called "tyee." In Prince William Sound the small redfish are called "bluebacks" and the large ones "redfish." At Klawak and Sukkwan the coho is called "tyee," and at Killisnoo the same salmon is called "kluck."

RELATIVE IMPORTANCE OF THE SALMONS.

The salmon pack of Alaska, considered in the order of the market values per case of the canned fish, is made up of king, redfish, cohoes, and humpbacks; and, in the order of abundance for commercial use, redfish, humpbacks, cohoes, and king. It is said that there are more humpbacks in the streams of Alaska than redfish; and this is undoubtedly true in certain sections, such as southeast Alaska. In the opinions of the canners, with which I am in hearty accord, the coho should rank next after the king salmon in food value. Its meat is more delicately flavored and contains more oil than that of the redfish, but it lacks the full, deep, red color of the latter, which is popularly supposed to indicate the best quality of salmon. In reality, the redfish is coarse and dry compared to the coho.

The dog salmon are packed very sparingly; in fact, in only one cannery was this species utilized as such in 1897, and then only about 1,000 cases were packed. In another locality, in one cannery, a few humpbacks and dog salmon are packed together under humpback labels, and at nearly all canneries, where different species are packed, a straggling dog salmon, if in good condition, may be included; but as a rule dog salmon are not used, and may be considered a waste species.

The run of none of the minor species of salmon in 1897 outside of Bering Sea was very large, except that of humpbacks in southeast Alaska; the humpback, king, coho, and dog salmon figure only incidentally in the packs. A reference to the detailed output by canneries will make this clear. None of the canneries were able to handle the supply of humpbacks in 1897, and they were obliged to limit the catches. Of the total number of this species packed, 140,506 cases, or nearly 90 per cent, were credited to southeast Alaska. The waste was very large; not only were the canneries obliged to reject many fish, but at the fisheries double the number that could be sold were frequently hauled. At Fish Creek one seine haul contained 22,000 humpbacks. While there was an over-abundance of humpbacks, the redfish were very scarce, and the pack of this species is small compared to 1896, which was a good redfish year.

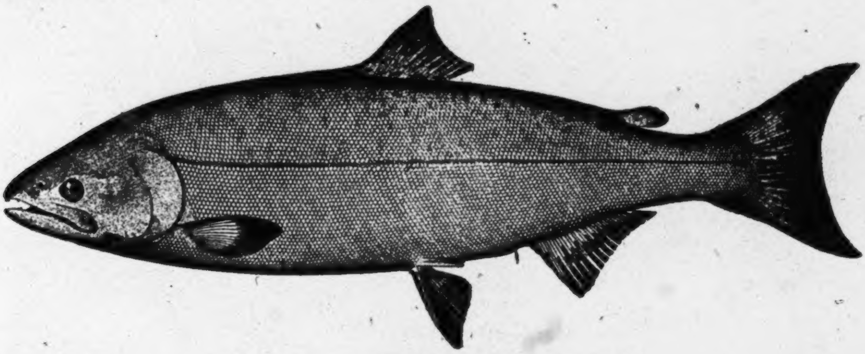
In 1897 the different species were represented in the pack as follows:

Species.	Cases (each consisting of 48 one-pound cans).	Percentage.
Redfish	688,581	75.74
Humpback	157,711	17.35
Coho	43,557	4.79
King	18,133	2.00
Dog	1,096	0.12
Total	909,078	100.00

THE SALMON RUNS.

In the detailed accounts of the different streams are given the times during which the various species of salmon run, based on the delivery of fish at the canneries. There is a great variation in the streams, but by referring to these records and to the table which gives the packs for the different canneries and the dates between which the packs were made, a fair idea may be obtained of the time when salmon run in sufficient numbers for commercial purposes. These dates vary greatly, but it appears as though the onshore movement came from the westward, the large rivers of a region receiving the first impulses. This movement is but natural when it is considered that the larger streams extend their influences wider and farther, and the fish naturally come first within the influence of these waters and follow them to their sources.

The king salmon, as a rule, probably come first; and, while not abundant at any fishing station in Alaska, they are found scattering everywhere, and individual stragglers occur in nearly every stream and throughout the entire season.



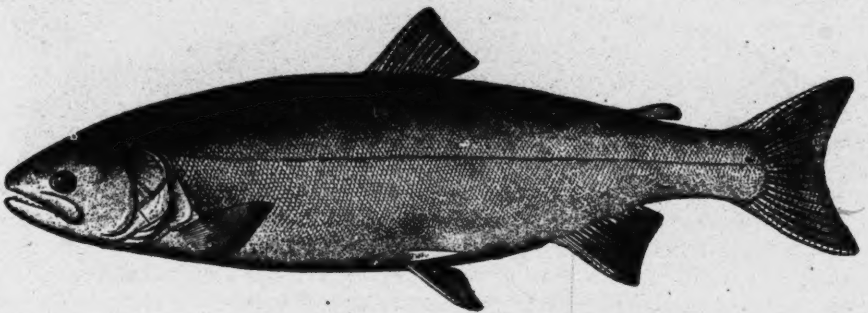
THE KING SALMON (*Oncorhynchus tschawytscha*).

As soon as the ice clears sufficiently to permit fishing the king salmon are taken, the earliest at the Copper River about May 6, at the mouth of the Stikine River about May 15, while Cook Inlet and Taku River are not sufficiently clear until later—about May 25. In these localities a few redfish are taken with the earliest fishing, showing that they are present, and as soon as they run in sufficient numbers to fish for them the gear is changed, except in Cook Inlet, where king salmon are fished for until the latter part of July. The fishing for king salmon in other localities does not cease because fewer fish run, but because the run of redfish is much larger and the fishing more profitable. It is generally believed, and my observations confirm the view, that the king salmon run in numbers only in streams fed in part by glacial waters.

In different parts of this report, under stream or cannery headings, detailed reference is made to the runs of redfish, which need not be repeated here. In localities other than those in the vicinity of the larger rivers—that is, on purely redfish ground—it will be noticed that they run first in the Karluk district, where packing usually begins during the first days of June; Chignik follows about the middle of June, and Prince William Sound and southeast Alaska in the latter part of the same month. The streams nearer the sea receive the first fish, though there are many exceptions, as will be seen by reference to the stream notes. The run at Karta Bay, for instance, which is well inside, and a long distance from the outside waters, is very early. There is a great variation in time even in adjoining streams; and while in some streams in southeast Alaska redfish run early—that is, before July 1—few canneries in that section begin to operate before July 1 to 7, and those that operate probably do not pay expenses; but they get their fisheries organized and the cannery in running order, and when the big runs commence they are ready for work. Pyramid Harbor and Wrangell, where a few king salmon are packed, commencing in May, should be excepted.

In southeast Alaska different streams are often referred to as "early" or "late" for certain species, and while there is undoubtedly some difference, and occasionally considerable, it is probably not so great as is often imagined. A stream having a large number of salmon will have the earliest arrivals in sufficient numbers to make their presence apparent, while a stream producing 5,000 to 10,000 will have so few early arrivals that they will not be noticed.

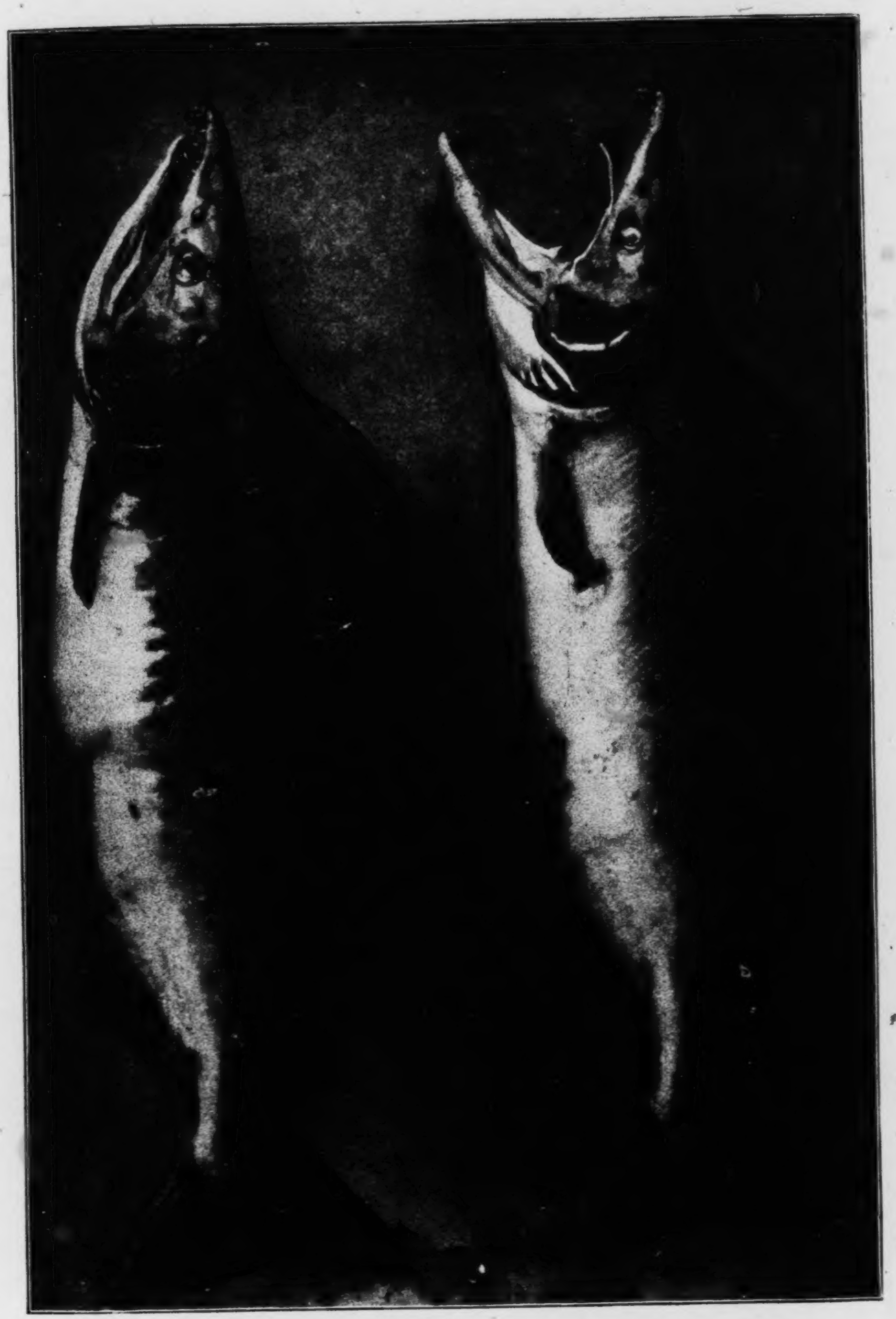
Except at Karluk, where the runs frequently extend to the first of October, and in the large rivers, the cannerymen usually count on about six weeks for the duration of the run of redfish; but if there is a variation in the time of commencing the run there is a still greater variation of time at the end, and in many localities much depends upon the stage of water in the river. If the water is low, so the fish can not ascend, they are held in the salt or brackish water and do not seem to ripen so rapidly, but if there is sufficient water they do not remain around the mouth of the river very long, but pass rapidly to the lakes.



THE COHO OR SILVER SALMON (*Oncorhynchus kisutch*).

The bulk of the redfish pack is made in July and the early part of August, though most of the canneries pack until the latter part of August, and some into September, but except at Karluk these are only a few fish that are taken in connection with the humpbacks and cohoes, which then form the body of the pack.

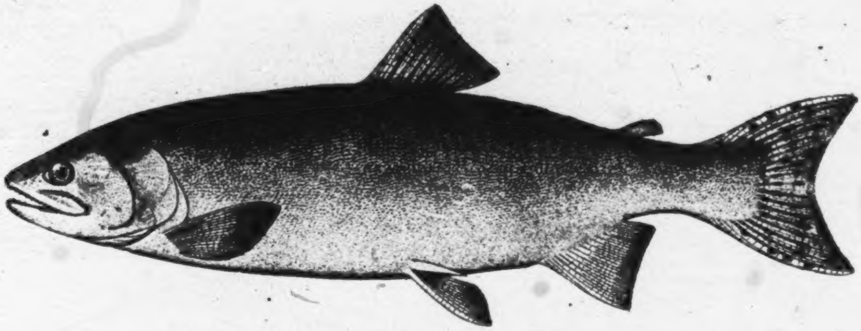
Cohoes are not plentiful anywhere in Alaska. Those from the streams on the mainland are said to be larger than those from the island streams. The run for commercial purposes commences the first week in August and continues until after the canneries close, September 20. There is, however, the same variation in the runs of cohoes as noted for redfish. The cannery at Wrangell, which packs cohoes from Lake Bay, usually commences canning the first week in July; at Tolstoi (Thorne Bay) the fish run nearly at the same time, but these are unusually "early" streams; as a rule, they are in other localities from three to four weeks later, though scattering fish are taken throughout the season.



HUMPBACK SALMON FROM STREAM AT HEAD OF UGANUK BAY.

Humpbacks may be said to run in southeast Alaska, where the principal pack of humpbacks is made, from July 15 to August 15, though some years they may be a week earlier, and at some canneries these fish are packed until September 1. In Prince William Sound they seem to be about a week earlier. It is said that they are in good condition for packing only about one month. Late in the season the meat seems watery, and it is difficult to prepare a can of full weight.

Dog salmon are not very numerous, and as they are not used for commercial purposes no record concerning their run is available. At Chignik in 1897 the run was at its height August 1, forming at that time 5 per cent of the catch; at Uganuk, Kadiak Island, the fish were dead and dying in the streams on August 12; at a cannery in southeast Alaska a few were packed from July 17 to August 6; at Hunter Bay the run is said to last from August 1 to October 1, which is doubtless an error; at Tolstoi it is said they run with the humpbacks, which is probably more nearly correct. They are, however, taken scatteringly throughout the season. Along the Alaskan Peninsula and the Aleutian Islands they are preferred by the natives for their winter supply of "ukali."



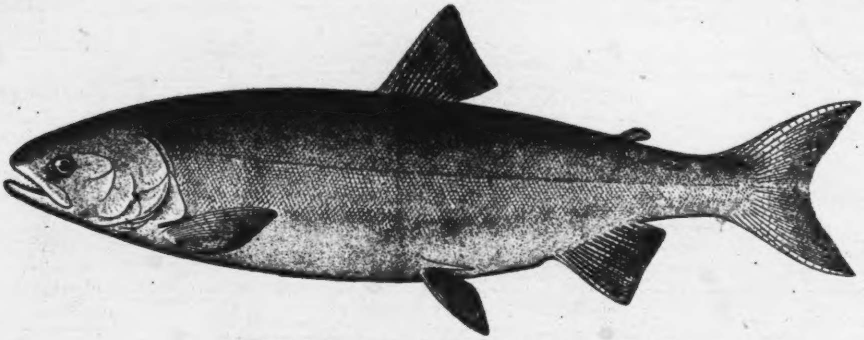
THE HUMPBACK SALMON (*Oncorhynchus gorbuscha*). Sea-run.

No definite information about steelheads was obtained. They are nowhere very abundant, are not used except for local purposes, and probably run when the canneries are closed. At Ketchikan it is said they run from the middle of May to the last of June, though some seasons they are seen as early as the middle of April. At Tolstoi it was claimed they run from November to April, but are taken about every month in the year in various conditions of spawning.

SPAWNING AND OTHER HABITS.

Little is known of the sea habits of salmon, and it may therefore seem useless to speak in this report of beliefs and impressions which have been acquired in various ways and through different agencies. It is quite generally supposed that salmon return to the streams in their fourth year, and that they run to the same waters in which they were hatched, but these theories are questionable. Fishermen state that every four years there is a big run of fish and cite one or two instances to prove it, but this will stand little investigation. If the four-year theory were correct, the progeny of the big runs would return fully matured four years from the time the parent fish entered the stream to spawn. The fish that enter the streams during the summer months spawn late that summer or during the fall. In some instances the redfish spawn until December, and other species later. In the cold waters of autumn it is at least four months, and usually longer, before the fish is evolved from the egg and has absorbed the egg-sac. It is probably spring or early summer before it is a free swimmer and takes food of its own capture, and it is quite certain that nature has not endowed it sufficiently at this time to take care of itself in the open sea. So far as can be learned, it is a year from this time, or the following spring or summer—two years from the time of the arrival of the parent fish—before the young proceed to salt water, and they are then 4 or 5 inches long.

It is no doubt true that many salmon less than a year old find their way to the sea, but they probably have been swept from the breeding-grounds by currents or other adverse conditions, and have not proceeded to the salt water by their own volition.



THE DOG SALMON (*Oncorhynchus keta*).

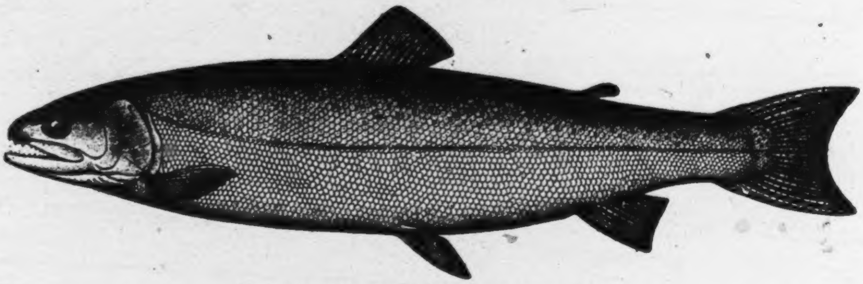
At Klawak it was learned that in early spring there are two sets of salmon in the lake—one about 4 inches long and another about 1½ inches long. After the ice leaves the lake and river the larger ones move downstream to the mouth, where they remain for some time and can be seen in very large numbers, all the species that run in the stream being represented. Mr. J. C. Callbreath has made the same observation in his hatchery work in Alaska, and has also noticed the cannibalistic tendency of the older fish. He therefore places the output of different years in separate lakes.

It is probable that the young salmon in passing to the sea remain near the edge of the continental plateau until they mature, and it is also probable that all fish of the same species do not arrive at maturity at the same age; in other words, the fish from the same spawning do not all mature the same season. In nearly all the streams that have runs of red salmon, numbers of small but fully matured fish of the same species are found, and it is said these are all males. In the lake at Klawak were seen some of these small salmon, from 1½ to 2 pounds in weight, that had spawned. Some were alive, but in the last stages, and others were dead on the beach—all red-colored, hook-jawed, and emaciated. At Chignik there are so many of these small fish that they are called by a different name—"Arctic salmon." Reference is elsewhere made to the very small mature redfish that run at Necker Bay. These may all be young fish that matured early and before others of the same output, or they may represent a race of dwarfed redfish, such as are found in the lakes of Idaho and Washington.

In conversation with cannerymen it was found that those who appear to have paid some attention to the matter place the age of large, matured salmon much higher than the four-year theory warrants. Usually, when asked the question, the more intelligent state that, in their opinion, the fish are from 8 to 10 years old, but of course this is a matter of conjecture.

The spawning-ground sought by salmon is a sandy and gravelly bottom in a pool or eddy where the water is 2 to 3 feet deep, but this is not always attained. The redfish is probably the most fastidious in its selection, and after the redfish is the coho; the dog salmon and humpback spawn anywhere.

It is well known that the redfish enters only those streams that are lake outlets, and it is generally believed that it does not spawn in the lakes, but always in an entering stream. Elsewhere in this report it has been shown that this is not always the case. Usually the lakes are deep and have little shore shelf, so that the fish enter the inflowing streams where the proper depth and bottom is found; but when the lake is properly conditioned, has a sandy or gravelly bottom, gradually shelving, the redfish will spawn in it, though they undoubtedly prefer the conditions usually presented by an inflowing stream.



THE STEELHEAD (*Salmo gairdneri*). Adult.

When the fish are ready to spawn they excavate a nest by plowing up the sand and gravel with the nose and sweeping it out with the tail. The nests are sometimes 3 feet in diameter and 12 to 18 inches in depth. The female then deposits the eggs, which are quickly covered with the milt of the male. The eggs usually fall and lodge between the gravel on the lower side of the nest and are covered by the same process as adopted in building the nest. The parent salmon remain near the nest and fight off all intruders as long as they can maintain their position, becoming more and more emaciated and finally dying. Mr. Miller, of Klinkwan, who has lived in Alaska for some twelve or fourteen years and has noticed their habits, states that the red salmon spawn within six weeks to two months after they enter the streams, and he has observed them spawning until November, and occasionally even until December, under the ice. The eggs deposited late do not hatch out for three or four months, and early in the spring the young with the sac could be seen by taking up a handful of gravel from the bottom. Upon being released they wriggle back and burrow in the gravel again. He states that the young fish do not become free swimmers until some time after they are hatched; they dodge around under stones and sticks, come to the surface and nibble at some passing object, and dart back again. This is usually in the spring, and he states that they remain in the lake until the following spring and that they then return to the sea. This information, he says, he obtained from personal observation.

So far as known, observations have not been systematically made on the natural spawning habits of the salmon in Alaska, and only on rare occasions has anyone been met who had ever observed salmon spawning there. The cannerymen are in the country for fish and not for investigation or scientific research. Very few have ever even seen the lakes supplying the streams from which they obtain their supply. In the fall the canneries are closed and left in charge of the watchmen, and they, with the white stragglers who remain around, probably hibernate. At any rate, they think no more of salmon until the next packing season commences.

Reference has been made chiefly to the late-spawning fish. While it is probable that many of the fish remain in the fresh water for six weeks or two months before spawning, others are more advanced and spawn soon after their arrival. The manager of Yes Bay cannery states that he has seen young salmon with the egg-sac attached as early as the middle of September. Mr. Bell, who has been a permanent resident of Alaska for a number of years, and who has been superintendent of a cannery and now owns the saltery at Tolstoi (Thorne Bay) where he lives, says that in the late fall he has observed large numbers of very young salmon in the lakes; that he has frequently watched the spawning fish, and that rarely are the male and female ready to spawn at the same time, and the one that is delayed will beat itself on the bowlders or gravel apparently to hasten the ripening. He further states that in many instances they are unable to void the spawn, and both male and female die before their natural functions are fulfilled, he having frequently cut open the dead swollen fish on the shore and found the eggs or milt in them.

Mr. Callbreath refers to this subject with a similar experience, and I have seen the same with dog salmon.

Mr. Bell, in speaking of humpbacks, remarked that he had seen a number spawn in the same nest, others in brackish water, at high tide, and when the nests were uncovered at low water the sea birds consumed their eggs, and that he had observed well-filled nests destroyed and the eggs thrown out by other humpbacks that had selected the same place for their nests.

At the head of the south arm of Uganuk Bay, Kadiak Island, is a stream having dog salmon and a few humpbacks, on which I spent a day, August 11; a description of it may give some idea of the appearance of these streams during the spawning season. The following is quoted from field notes:

> Left the ship at 6 a. m. on a general reconnaissance. Passed down South Arm, which we found to be a straight, apparently clear body about 5 miles long and an average width of not much less than a mile. At the head of the arm is a flat, through which flows a small stream about 20 feet wide. It was low water, and we landed on the edge of the flat and followed the stream a few hundred yards, where it passed between two high rocky bluffs, probably a hundred yards apart. Inside this passage a large tidal basin opened, about 1½ miles long by 1 mile wide, which at low water is a great mud and gravel flat with the stream flowing through it by several channels, and at high water is covered with 6 or 8 feet of water. At the head of the basin the stream empties between grassy banks that are low and extended for some distance, with here and there a scrub growth. Over the grass plain bordering the river, the bear trails were as thick as the lines on a checker-board, and in many places close to the water the grass was beaten down and the bones and half-consumed fish plainly indicated the presence of bears.
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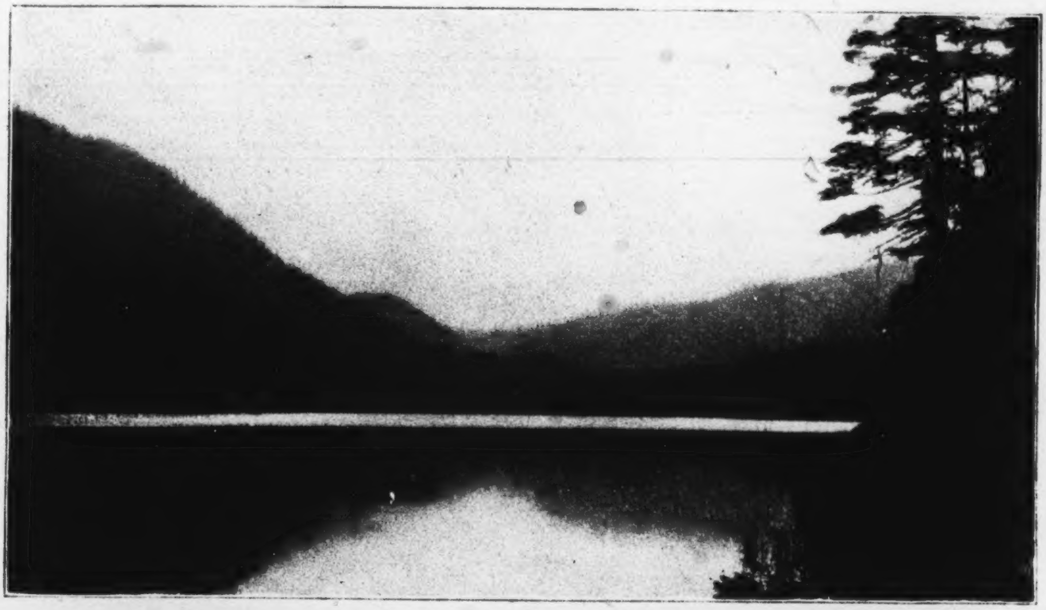
> At the mouth of the river we first encountered the ascending salmon; they were mostly of the dog species, all barred, though a few humpbacks were present. As we advanced they increased in num-



LAKE, WEST BRANCH OF SKOWL ARM, LOOKING UP

SPAWNING BEDS IN STREAM, SKOWL ARM, KASAAN BAY.

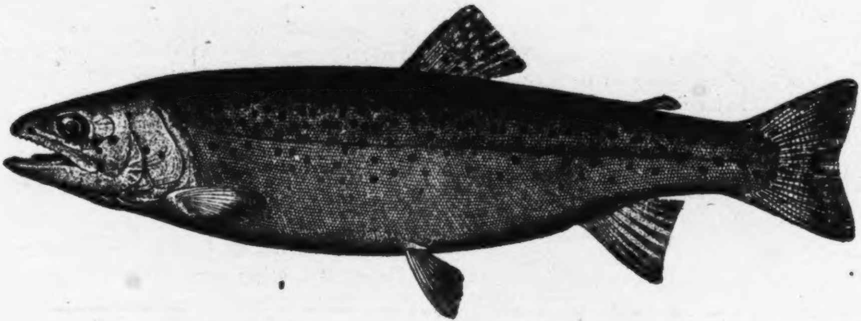
bers until it seemed as though in places one could no longer advance through them. It was simply full of dog salmon in all stages, from those in but a short time from the sea to the spent and dying. There were thousands upon thousands of them and other thousands dead on the banks or floating down with the current. They struggled over riffles only a few inches deep and when disturbed dashed about, frequently throwing themselves bodily on shore. We followed the stream about two miles and it seemed in places as though we were wading in salmon; they would often strike one's leg with considerable force, swim between one's feet, and in walking we at times stepped on them, and frequently touched them with the foot. But what a change had come over these fish from the time they first entered! Those that were spent, and some that had not spawned, were in all stages of decay, repulsive-looking objects, all dying, some in their last struggles. The flesh of many was deeply gashed as though decaying, the fins frayed and torn, the skin gone in places showing dirty and sickly-looking yellow flesh, skin hanging in shreds from the head, jaws heavily hooked in the males, teeth prominent, body thin and emaciated. The water was polluted and had a bad smell which was intensified by the stench from the decaying salmon on the beach. Those in the last stages when turned over had hardly the strength to right themselves. I had my trout gear with me and there were plenty of trout hanging around the salmon, the more vigorous of which, divining their purpose, would frequently dart at them, but the sight of the fish and the stream quelled my fishing ardor and the gear was not put in service.

We kicked a large number of salmon out on the banks and hooked others out with sticks, and examined them. My first surprise was that the males were largely in excess, and whatever the condition, with few exceptions, even those nearest death had milt. Of the females, the greatest number were full of eggs, separated and ready to flow, not only those that were still vigorous, but including many in the last stages, fish that certainly no longer had strength for nest-building. These fish when kicked out would void some of their eggs, and when pressed along the belly would shoot their eggs in great jets. In a few instances we found dead fish on the banks that had spawn in them. I did not understand these conditions then and do not now. My impression was that the salmon arrived on the spawning-ground in ripening condition, performed its natural function, declined, decayed, and died. But here were fish, and many of them not more than a few days, some indeed hours, from death, that were full of spawn. They were on the spawning-ground, for the bottom of the stream was in holes and ridges, made so by the nests.

On August 25 I spent a day on a humpback stream in Prince William Sound. The stream is a very small one, not more than 15 feet wide, and did not carry much water, though there were many deep pot holes. This stream, in places, seemed to be packed solidly with humpbacks, all struggling to ascend. In places where the water flowed over riffles, not over an inch or two deep, they seemed to rise out of the water and would wriggle, moving rapidly, for a distance of 10 to 15 feet, until deeper water was reached. At the mouth of the stream I kicked out 40 or 50 fish and examined them. The males were hook jawed and humped, but all were bright-colored and vigorous fish; yet upon pressure the milt flowed readily in the males and the eggs were separated in the females, some of the eggs being voided in landing on the banks; yet these fish were evidently just entering the stream.

Near the head of the stream I was much interested in observing the spawning. A female was over a so-called nest, which was an excavation in the gravel, of apparently rounded form and quite large—I should say nearly 4 feet in diameter and 18 inches deep. The female remained over the nest, but occasionally turned from it to drive off what seemed to be one of her own sex; the favorite male was near by, but he was more busily employed in keeping at a distance a number of male intruders. This male every minute or two would rise to the surface, and half out of the water would flap sideways on the surface as if beating the water; at other times he would descend to the bottom and seem to chafe his belly on the gravel. A small pebble thrown in the water did not disturb them, but a larger stone thrown with a splash over the nest sent all scurrying away, the female darting back very warily after a few minutes and occupying her place over the nest, followed later by the male. At a second nest a female held the position against all intruders, male or female; any fish approaching within 6 feet was attacked.

Cannerymen and fishermen in Alaska all agree that hardly any two streams in the Territory carry exactly the same redfish or other species of salmon, but the redfish is the only one that receives much attention, the others being taken incidentally. It is said that there is a slight difference in general form, color, and texture which fishermen recognize, as well as a large difference in weight. Upon this hangs the idea persisted in by many fishermen, that salmon do return to their parent stream; and if the differences mentioned do exist, the theory based upon them must have great weight. I have never been able to detect the variations in form, etc., except the well-known changes which take place in each fish from the time it arrives from the ocean until death overtakes it on the spawning-grounds, but there seems to be a difference in the quality, fish from certain streams being considered better than others. For instance, the best redfish in Alaska are said to be the Chilkat redfish, in that they are more delicate in flavor and more oily.



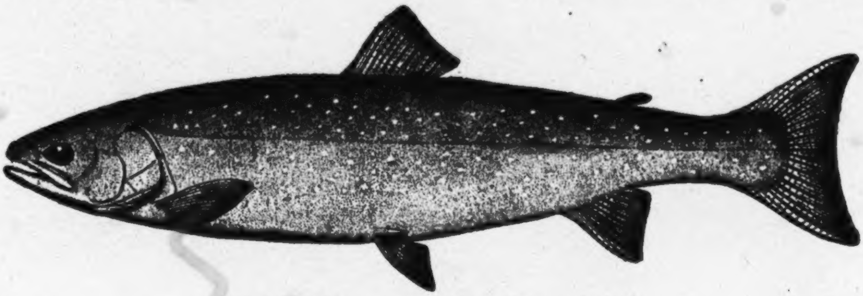
THE RED-THROATED TROUT (*Salmo mykiss*). Adult.

There are undoubted and undisputed differences in average weight, and so well known is the weight of redfish that run in different streams that contracts are made and prices paid accordingly; for while the number of fish required to pack a case varies, it practically remains the same for each stream from year to year.

As extremes of weight, it may be mentioned that Quadra stream carries 8-pound redfish, while Necker stream (about 35 miles south of Sitka, on Baranof Island) has redfish averaging about 2½ pounds in weight. These are not accidental runs, but people who have fished these streams for years assert that each year these streams have the same fish with little or no variation. It is probable that the fish vary more in the same stream than is stated. At Karluk the early run usually consists of fish from 14 to 15 and even as high as 17 to the case, but as the season advances they come down to 12.

At all places visited by the *Albatross* inquiries were made as to whether spent salmon had ever been seen returning to the sea, and the usual reply was that, with the exception of king salmon and steelheads, they all died at the headwaters after spawning. Some of the cannery superintendents whose opinions were obtained had fished in Alaska twelve to fifteen years; others were men interested in the fisheries who had lived permanently in Alaska for ten or more years. In one instance a canneryman had set nets to take returning spent salmon, but never caught a single fish. At the office of the Alaska Packers' Association, in the presence of six or eight cannery superintendents, the same question was propounded, when one of them, from a Bering Sea cannery, said he had seen spent salmon returning to the sea. Upon closer inquiry, however, it was learned that the current at this locality was very strong and had swept the weakened and emaciated fish down, but that they were heading upstream. I have personally seen both humpback and dog salmon swept downstream by the current to salt water, but they died, nevertheless. I have no doubt that all species of salmon, except some king salmon and steelhead trout, die after spawning, and I believe that if directly after spawning they were transferred to salt water they would also die.

One of the greatest sources of destruction to the redfish, and, in fact, to all salmon, are the trout, both the Dolly Varden (*Salvelinus malma*) and the cut-throat (*Salmo mykiss*). Early in the spring, or shortly before the redfish commence to run, the Dolly Varden comes to the mouth of a stream and awaits the salmon, and about the same time the cut-throat comes down the stream to brackish water to welcome the new arrivals; together these two follow the salmon to the spawning-beds. The Dolly Varden is usually found wherever the salmon is, of whatever species; the cut-throat more rarely. On the spawning-grounds, when the ripe fish deposit their eggs, the trout consume them in immense numbers. The Dolly Varden has been seen to take the salmon eggs as they were dropped. The salmon know these egg destroyers and will frequently dart at the trout, but the latter are quicker in their movements and get away without injury.



THE DOLLY VARDEN TROUT (*Salvelinus malma*).

The next great destroyer of the redfish eggs is the humpback salmon. When these fish have access to the redfish spawning-grounds, they will spawn over the redfish nests. The humpback arrives later than the redfish, and in building its nest the redfish eggs are flung about, disturbed, and destroyed. Usually humpbacks are present in nearly all streams, though they can not ascend some that are open to redfish, because the latter are more vigorous and can surmount obstacles that the former can not. In such cases the humpback spawns in the lower courses of the stream in pools and eddies—in fact, often in brackish water and on banks of sand and gravel that are exposed at low water, where the eggs are of course lost.

ESTABLISHMENT OF SALMON CANNERIES IN ALASKA.

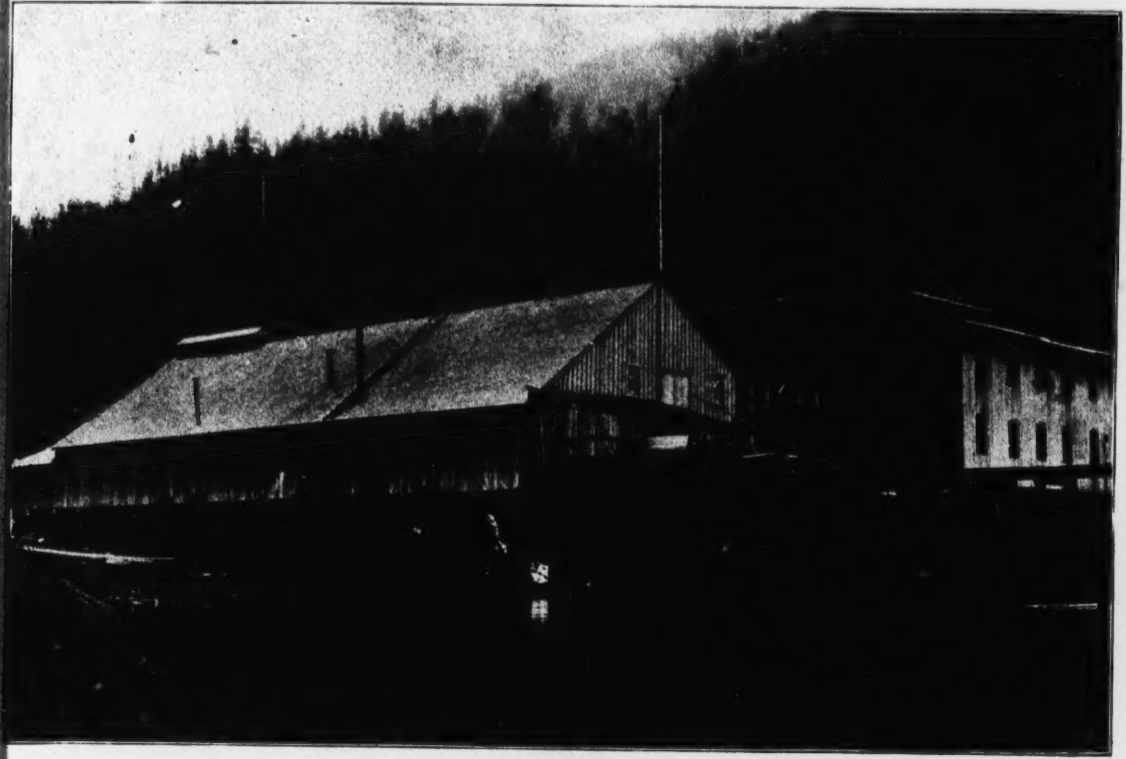
As it will be necessary in this report to refer frequently to the commercial organizations doing a salmon-packing business in Alaska, it may not be out of place here to give a short account of the growth of this industry, in order that the references may be properly understood, although an account of each cannery will be hereafter given.

The first canneries in Alaska were at Klawak and Old Sitka, both built in the spring of 1878. At the former place the North Pacific Trading and Packing Company erected their plant, made a pack that year, and have done so every year since. At the latter place the Cutting Packing Company commenced operations, and, after making two packs (1878 and 1879) the cannery was closed. In 1882 its available machinery was moved to Cook Inlet by the Alaska Packing Company of California, and there utilized in a cannery built that year at Kussilof, now known as the Arctic Fishing Company.

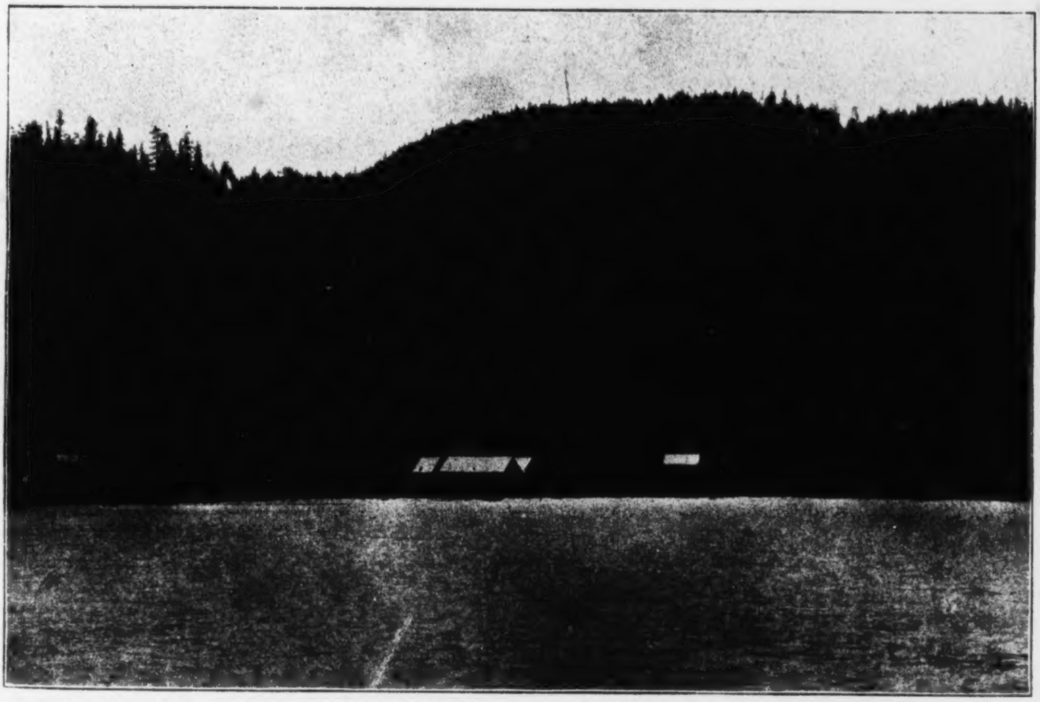
Transport ship at Chignik.

No additions were made to the Alaska canneries until 1882, when the cannery just mentioned was built and the first cannery on the Karluk River appeared, built and operated by Smith & Hirsch, and now known as the plant of the Karluk Packing Company.

The year 1883 saw three additions—Pyramid Harbor Packing Company, Chilkat Packing Company, and Cape Fox Packing Company, all in southeast Alaska. In 1884 the first cannery in Bering Sea, the Arctic Packing Company, on the Nushagak River, commenced operations, followed in 1886 by the Bristol Bay Canning Company and the Alaska Packing Company, both at Nushagak. In the year 1887 one more cannery was added to the list, that of the Aberdeen Packing Company, on the Stikine River, in southeast Alaska. During the same year the plant of the Cape Fox Packing Company was moved to Tongass Narrows and operated under the name of the Tongass Packing Company.



CANNERY AT BOCA DE QUADRA.



SALMON SALTERY ON THORNE BAY.

In 1888 the following additional canneries were in operation: Alaska Salmon Packing and Fur Company, at Loring, southeast Alaska; Cape Lees Packing Company, at Burroughs Bay, southeast Alaska; Northern Packing Company, at Kenai, Cook Inlet; Kodiak Packing Company and Aleutian Islands Fishing and Mining Company, both at Karluk, Kadiak Island; Arctic Packing Company, at Larsen Bay, Kadiak Island, and the Nushagak Packing Company, on the Nushagak River, Bering Sea.

The increase of canneries in 1888 and their large output called the attention of the public to the Alaska salmon fisheries, and in 1889 there was a further increase of canneries, as follows:

Southeast Alaska: Boston Fishing and Trading Company, Yes (McDonald) Bay; Baranoff Packing Company, at the Redoubt, near Sitka; Astoria and Alaska Packing Company, Freshwater Bay; Bartlett Bay Packing Company, Bartlett Bay, and Chilkat Canning Company, Chilkat Village.

Prince William Sound and Copper River: Peninsula Trading and Fishing Company, Little Kayak Island; Central Alaska Company, Little Kayak Island; Pacific Packing Company, Eyak, Copper River, and the Pacific Steam Whaling Company, Eyak, Copper River.

Kadiak and Chignik: Hume Packing Company, Karluk; Alaska Improvement Company, Karluk; Arctic Packing Company, Alitak Bay; Kodiak Packing Company, Alitak Bay; Royal Packing Company, Afognak Island; Russian-American Packing Company, Afognak Island; Chignik Bay Company, Chignik Bay; Shumagin Packing Company, Chignik Bay; Chignik Bay Packing Company, Chignik Bay; Western Alaska Company, Ozernoi, Alaska Peninsula; Thin Point Packing Company, Thin Point, Alaska Peninsula.

The cannery of the Alaska Improvement Company, at Karluk, was built and ready for operation in 1888, but the loss of the *Julia Ford*, the cannery ship, with all the season's outfit on board, kept the cannery closed, and the first pack was therefore made in 1889.

In 1888 there were 17 canneries in operation in Alaska with an output of 412,115 cases, and in 1889 there were 37 canneries with an output of 714,196 cases. Two more canneries were added to the list in 1890—George W. Hume, at Kussilof, Cook Inlet, and the cannery of the Metlakahtla Industrial Company, in southeast Alaska. In 1891 only one new cannery, that of the Bering Sea Packing Company, at Ugashik, Bering Sea, was added, while several operated the year previous were closed, and in a few other cases there was a consolidation of interests. In 1892 and 1893 there was a further consolidation of cannery interests, and in the latter year one additional cannery was operated, that of the Hume Canning and Trading Company, in Tanglefoot Bay, near Karluk. There were no new canneries built in 1894, but in 1895 two more were in operation at Naknek, in Bering Sea, the Arctic Packing Company and the Naknek Packing Company.

In 1896 the following new companies were in operation:

Southeast Alaska: Quadra Packing Company, in Mink Arm, Boca de Quadra; Pacific Steam Whaling Company, Hunter Bay.

Kadiak Island: Uganuk Fishing Station, Uganuk Bay.

Alaska Peninsula: Hume Brothers & Hume, Chignik Bay; Pacific Steam Whaling Company, Chignik Bay.

Bering Sea: Point Roberts Packing Company, at Koggiung, Kvichak River; Ugashik Fishing Station, Ugashik River.

In 1897 two more canneries were added—Hume Brothers & Hume and the Pacific Steam Whaling Company, both at Uyak Bay, Kadiak Island.

The foregoing account gives briefly the dates of the building of the canneries in Alaska. After 1891 several of the canneries were consolidated, a few were burnt, some were dismantled, and the available machinery utilized in the construction of plants in more favorable localities, and in some instances the sites were entirely abandoned. The large increase in canneries in 1888 more than doubled the pack for that year over that of 1887, and the addition of twenty more canneries in 1889 increased the pack for that year and for the two years following to nearly double the quantity packed in 1888. The market became glutted, and in order to reduce the output a consolidation of interests followed. This was not very difficult, as a few individuals controlled a large number of the canneries. One firm in San Francisco alone controlled six canneries, with an output in 1889 of 155,118 cases; others controlled several.

Cannery at Chilkat.

In 1890 the three canneries at Chignik combined under an operating agreement known as the Chignik Bay Combination, under which the plant of the Chignik Bay Company was operated, the three canneries sharing the expense and dividing the output equally. This arrangement remained in force during the seasons of 1890 and 1891. Its evident success in 1890 probably led to the local combinations on Kadiak Island in 1891, and then to the association which now exists.

The large packs during this period and the glutted market caused the cannery interests to devise some scheme to meet the conditions. The combination at Chignik in 1890 permitted the pack to be made there at a lower rate and, as previously stated, it was continued in 1891. The same year (1891) the canneries at Karluk, Uyak, and Afognak entered a combination under the name of the Karluk River Fisheries, under which it was agreed that each cannery should have a quota of fish from the several localities, based upon the average packs of each cannery in 1889 and 1890. The estimated pack for the canneries interested was placed at 250,000 cases, and upon this estimate the apportionment of the work at each cannery was made. Under this agreement four of the eight canneries were closed, their quota being packed in the other four canneries as follows, viz, that of the Royal at the Karluk, of the Arctic at the Kodiak, of the Aleutian Islands at the Hume, and of the Russian-American at the Alaska Improvement.

In the summer of 1891 the Kodiak Packing Company* and the Arctic Packing Company, both at Alitak Bay, also had a mutual agreement under which only one cannery, the Arctic, was operated, the quota of fish of the Kodiak being packed in the Arctic cannery. By these combinations the full pack of the Karluk district was made in half the number of canneries and the expense of packing very considerably reduced.

Fish scow at dock, Chignik.

In September, 1891, the Alaska Packers' Association was formed to dispose of the unsold salmon of that season's pack (some 363,000 cases), and five trustees were appointed to manage the business. This association was not incorporated, and expired after the salmon were sold.

The successful operation of these arrangements led, in 1892, to an arrangement in which nearly all (thirty-one) of the canneries joined, entering under the name of the Alaska Packing (not Packers') Association, for the purpose of leasing and operating and therefore controlling the canneries and reducing the Alaska pack for that year, it being found too great for the market's demands. All the canneries in operating condition in 1892 were members of this association except the following, viz: Metlakahtla Industrial Company, at Metlakahtla; Boston Fishing and Trading Company, at Yes Bay; Baranoff Packing Company, at Redfish Bay; Chilkat Canning Company, at Pyramid Harbor; Alaska Improvement Company, at Karluk, and the Bering Sea Packing Company, at Ugashik.

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*Though the present approved spelling of the name of this island is Kadiak, the company retains the former spelling Kodiak.

The association was regularly incorporated on January 13, 1892, and shares were distributed on the basis of one for each 2,000 cases packed in 1891, and the profits were divided equally on all shares regardless of the amount of profits derived at the different points. Of the 31 canneries, 9 were operated by the association, while the others were closed, the Alaska pack being reduced one-half.

Stern-wheel steamer used in towing fishing boats and setting nets, Chignik.

The year 1893 found the Alaska Packers' Association organized and incorporated (February 9). This association was formed from the canneries that had joined the Alaska Packing Association of 1892, except the Pacific Steam Whaling Company, at Prince William Sound, and the Peninsula Trading and Fishing Company, the latter's cannery having been moved from Little Kayak Island to the Copper River Delta in 1891.

The agreement of 1893 was similar to that of 1892, except that the amount of profit was taken into consideration, in addition to the probable average quantity which could be packed at the different points. This was subject to adjustment for each district and no arbitrary rule was followed. Each cannery entering the association was obliged to purchase an additional amount of stock equaling two thirds of the number of shares received by it for its plant; that is, a company which received 1,500 shares for its plant was required to purchase 1,000 shares additional. The money received from this sale of extra stock was used as working capital. No shares were sold to the general public, the owners of canneries subscribing for the full amount.

SALMON SALTERY, KETCHIKAN.

The Alaska Packers' Association is the largest canning operator in Alaska. Of the 29 canneries operated in 1897, 17 belonged to this association, with an output of 669,494 cases, or nearly 74 per cent of the total pack, while the other 12 canneries packed 239,584 cases, or 26 per cent. In addition to the 17 operating canneries the association had as reserves 8 other establishments, besides several in a dismantled condition which have not, however, been abandoned.

The Pacific Steam Whaling Company has increased the number of its canneries during the past two years. In 1889 the company built and operated a cannery at Eyak, Prince William Sound; in 1893 it controlled the plant of the Peninsula Trading and Fishing Company in the Copper River Delta. In 1896 it built and operated a cannery at Hunter Bay, in southeast Alaska, and another at Chignik Bay, Alaska Peninsula. In 1897 a cannery was built and operated in Uyak Bay, Kadiak Island, and cannery buildings were erected at Kenai, Cook Inlet. Machinery will probably be installed in the latter ready for operation in 1898.*

SALTING SALMON.

Redfish are salted only in localities like Bristol Bay, where a large run sometimes taxes the cannery facilities, when the surplus is salted, and at Egagak (Bering Sea) and Tyonek (Cook Inlet), where the run is not large enough to maintain a cannery. A few king salmon are salted for private use at canneries where stragglers are taken in the general catch, and at places like Killisnoo, where a little salting is done on special orders.

The commercial salting outside of Bering Sea consists chiefly in whole cohoes and humpback bellies. In the latter the number varies according to the cutting. One saltery (Ketchikan) delivered humpback bellies under contract to a cannery at $3.25 per half barrel, and tried to cut 160 bellies to that measure. This product should reach retailers on the Pacific coast at, say, $5, and if sold at 5 cents per belly would bring $8, making a good profit for the venture and a cheap fish for the consumer.

It is very difficult to obtain accurate saltery statistics. The low price of salt salmon, and the terms offered by the canneries in the purchase of fresh fish, have induced the men formerly engaged in salting to sell their fish fresh, the cannery tender calling for them, and to salt only those that are not called for in time, or the surplus in the event of a large run. Small schooners frequently move from one stream to another when the run is small and salt a few fish on board. It is doubtful if there are more than three or four salteries in Alaska, outside of Bering Sea, that are conducted purely as such, and these are in remote places where the catch is uncertain or it is inconvenient for the cannery steamer to call; the others are operated only to make use of the fish not sold fresh.

On account of the variation in the weight of the same species it is rather difficult to give even an approximate estimate of the number of live fish necessary to make a barrel of salt salmon, but the following may give a general idea of the subject: A barrel of salt fish contains 200 pounds of fish washed from the salting tub; 1 barrel of redfish has from 40 to 52 fish; cohoes from 25 to 35; humpbacks, from 70 to 80; king salmon, from 10 to 14. A barrel of humpback bellies represents from 300 to 320 fish.

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* The machinery was installed and the plant operated in 1898.

FISHERY AND CANNERY METHODS.

THE FISHERIES.

The methods employed in taking fish at the fisheries are given in detail in the descriptions of the canneries and streams, and will only be briefly referred to here. Each locality has its own methods, obtained by experience and believed to be the best. In general it may be said that in localities where the water is discolored gill nets are used, and if the topographical conditions are favorable traps are added; where the water is clear, drag seines give the best results. In southeast Alaska drag seines are used exclusively except at Chilkat and Wrangell. Drifting gill nets are used in Chilkat Inlet and at Taku by the cannery fishermen, while the Indians use small nets and gaffs in Chilkat and Chilkoot rivers, as described under other headings. The cannery at Wrangell uses gill nets in the fisheries at the mouth of the Stikine, but all fish obtained for this cannery in other localities are taken in drag seines. Spasmodic attempts have been made to work traps in southeast Alaska, but the results have not warranted the expense. Gill nets and purse seines have been tried in the lower section, but with indifferent success.

The canneries in Prince William Sound fish the Copper River delta with drifting gill nets, and the Prince William Sound streams with drag seines. In Cook Inlet the fishing is done with drifting gill nets, and by traps at prominent points along the shore leading to the rivers, and in the mouths of the rivers.

On Kadiak Island drag seines are used—a description of which will be found in the report—though gill nets have been experimented with, and for several years huge floating traps have been tried at Uganuk. The fishery at Chignik is carrried on principally with traps, but drag seines are also used and formerly gill nets, but these are not much in vogue now. In Bering Sea the fish are taken in gill nets and traps.

Outside of southeast Alaska the fishing is carried on entirely by the canneries; that is, when the cannery ships proceed to their stations in early spring they carry fishermen with whom contracts have been made for the season. Occasionally fresh fish are bought from the natives; but there are few natives, and fewer still who care to exert themselves beyond taking fish for their own wants, so that the number of fish thus furnished is extremely small, and the canneries can not depend upon this source of supply.

In southeast Alaska, while each cannery has fishermen of its own, a large part of the supply comes by purchase from native and white fishermen. These fisheries are conducted in various ways. A saltery may have been established by a white man near some stream or streams, and a certain right to the fishery is recognized. A cannery makes a contract with him to take all his catch at a certain rate, the steamer calling for the fish at fixed intervals. He employs his own men, boats, gear, etc. Or a cannery may supply natives, who claim to have rights in a stream, with nets and boats on condition that they sell all their catch to the cannery at certain fixed rates. A third method is for a cannery to send its own fishermen into a locality to do the fishing.

Many disputes arise concerning the fisheries. A native, whose ancestors have lived on a certain stream for many generations, and whose rights are respected by other natives, supplies a certain cannery with his catch, as possibly he has been doing for years. A rival cannery tells the native that he must sell his catch to it, and that otherwise their men will fish the native's stream. The result is overfishing, complaints, bad feeling, blows, and threats of bloodshed. So far as can be learned, there are now no legal rights or title to any fishing-grounds in Alaska except what force or strategy furnish.

LABOR AT THE CANNERIES.

The cannery fishermen are nearly all foreigners, the majority being "north countrymen," or, as they are termed, "hardheads," though there are some fishing gangs comprised of what are called "dagoes," consisting of Italians, Greeks, and the like. When these two classes form different fishing gangs for the same cannery, the north-country crew is referred to as the "white crew."

Cutting machine.

With the exception of Metlakahtla and Klawak, the packing at all canneries is done entirely by Chinese, and it is very satisfactory labor. The canneries make a contract with the Chinese controlling the labor at a stipulated amount per case, guaranteeing a certain pack. If the guaranteed pack is not made, they are paid as though it had been; if the pack is overrun, they are paid for the extras. They are conveyed to and from the cannery in the ships, are given a bunk-house where they all live, are provided with water, fuel, and salt, and are paid collectively, according to contract, from 40 to 46 cents a case, depending upon the location of the cannery and the facilities for packing. The Chinese make all the cans, receive the fish on the dock, where they are tossed into bins from the boats, and do all the labor until the product is ready for shipment; in other words, they receive the fresh fish at one cannery door and place them at the other in tin cans, boxed, ready for shipment. They have their own bosses, are ready to work at any and all hours, and apply themselves strictly to the work for which they are paid.

At Klawak in the early days Indians were paid $1 per day. Demands for higher wages resulted in a gradual increase until $1.50 per day was reached, while as the Indians became more expert they grew lazier and constantly clamored for increased wages. As the point had been reached where the prices paid for the work done made the pack too expensive to warrant a further increase, the manager decided to pay by piece-work. This was rather difficult to arrange, but was eventually accomplished. It was then found that each one performed about twice the amount that he had ever done by day's work.

Filling machine.

Under the piece-work system the Indian is still dissatisfied. During the time of our visit the labelers struck for higher rates; 25 cents was paid for 12 cases; they demanded 25 cents for 10 cases and got it. It is said that it now costs the cannery 60 cents a case to make the pack; one-half is paid in coin and the other half in store checks; but, deducting the fixed store profits, it still costs the cannery 51 cents a case. Chinese can be employed to make a hand-pack for about 45 cents per case.

At Klawak native women (klootchmen) are employed as labelers, fillers, cappers, and washers; boys as carriers and to assist at the gang-knives; and men in all other capacities. The least amount earned under the schedule is $1.50 per day for women, and from that amount to $2, and one woman has made as high as $4 a day as a labeler;

CANNERY AT LORING.

butchers have made as high as $5.60 a day. The work is not steady, but for the season the native women make from $80 to $100, and the better class of men $200. Fishermen are paid $2 a day, without board, and laborers $1.50 per day, for the time employed.

The complaint is made everywhere that Indian labor—that is, the labor of the men—is uncertain. After making sufficient wages to supply their personal wants and getting a few dollars ahead, the desire for hunting or fishing seizes them and they are apt to leave when they are most wanted. To provide against this contingency, a contract is made with the fishermen, upon which they are paid $1.50 down for every day's work, and the remainder is held until the end of the season; it is then paid if they remain, but forfeited if they leave without permission.

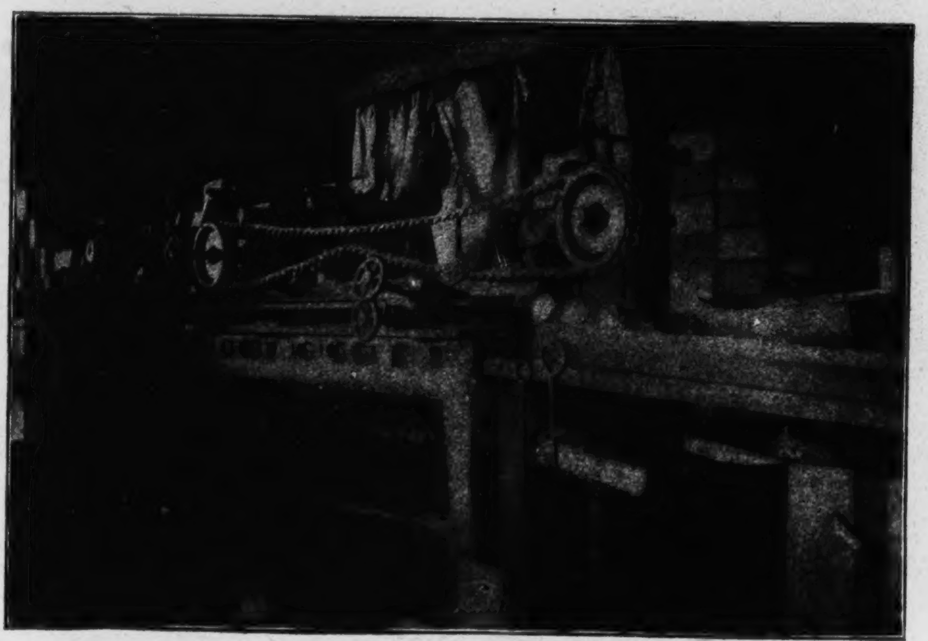
Topping machine.

The Indians are doubtless improvident, knowing that nature has provided for them without much labor. Their frequent boast is that white men and Chinese must work to get something to eat, while the waters and the forests furnish the Indians with all they want. A very small amount of money will supply them with the few necessaries which money alone will purchase.

In the spring of the year, when the cannery is opened, the Indian has spent his money and consumed his supplies. His wants are many, and he is willing to do any work; after these wants are satisfied he relapses, becomes lazy, and demands more wages. The Indians fancy the cannery is getting $6 and $7 a case for salmon, and that they are not getting what is due them. The manager at Klawak said that year after year he had acceded to their demands, but that now they had passed beyond the limit. The Indian is perfectly capable and can probably do the work as well as the Chinese if he could only be made to understand the exact conditions.

THE CANNING PROCESSES.

When the salmon collected from the various streams by the cannery steamers are brought to the fish wharf, they are transferred to the fish-bins by men armed with pews (single-tined forks). These men stand knee-deep in fish on the steamer or scow, impale one or two fish at a time, and by a rapid movement toss them to the top of the wharf, where others, also using pews, toss them into bins. The men become very expert in the use of these implements, and a constant stream of fish seems to flow from the steamer or scow to the wharf and thence to the bins. Elevators are used in some canneries, but they are not common in Alaska.



Soldering machine.

It is claimed that fish should be twenty-four hours out of the water before packing, so as to allow them to shrink, as when packed perfectly fresh so much juice is formed that in "blowing," after cooking, light weights are produced. In the fish-house and near the bins are arranged the butchers' tables, where the fish are cleaned. A stream of water is kept playing over the fish in the bins to remove the dirt and slime that collect on them, and they are then transferred to the tables, where the "butcher," after removing the head, seizes the fish by the tail, grasping it at the caudal peduncle, and with a few rapid strokes removes the fins, with one slash opens the fish along the ventral line, and by another removes the viscera. The fish is then transferred to a tank of water, where it is washed and scraped and the tail removed. In a well-regulated cannery it is passed to another tank of water, where it receives a second washing, scraping, and final brushing with a whisk-like broom. Being then thoroughly clean, the fish is transferred to large bins on either side of the cutting machine.

There is great variation in different canneries in all the various processes, but one principle in cutting is kept in view by all; that is, to cut the fish transversely in sections the exact length of the can. The usual method is to have a large wooden, cylindrical carrier, with ledges or rests on the outside the length of the carrier, wide enough to hold the fish, and slit in cross section through the ledges and outer casing to receive the gang-knives. The gang-knives are circular, fixed on an axle at the proper distances apart, and revolve at the highest point reached by the carrier and independently of the latter. The carrier and gang-knives are set in motion, each revolving on its own shaft. As a rest on the carrier comes to a horizontal position, men stationed at the fish-bins lay a fish on each ledge as it passes. Thence it is conveyed to the revolving gang-knives, and, after being divided, passes through and on the downward course the severed fish slides off the rest upon the filling-table.

Test kettles.

The cutting carriers of the larger canneries are usually elliptical. This form gives a larger carrying capacity and transfers the divided fish to a higher point, from which the filling is more readily done. In some of the smaller canneries the gang-knives are worked by hand. In this case the knives are not circular, but elongated or semicircular in shape, tapering at the outer ends. They are mounted on an axle having a large iron lever at one end, and when this lever is raised the ends of the gang-knives are thrown up and back. The fish is then placed in position under them and the lever pulled forward, when the knives, with a scimiter-like movement, divide the fish.

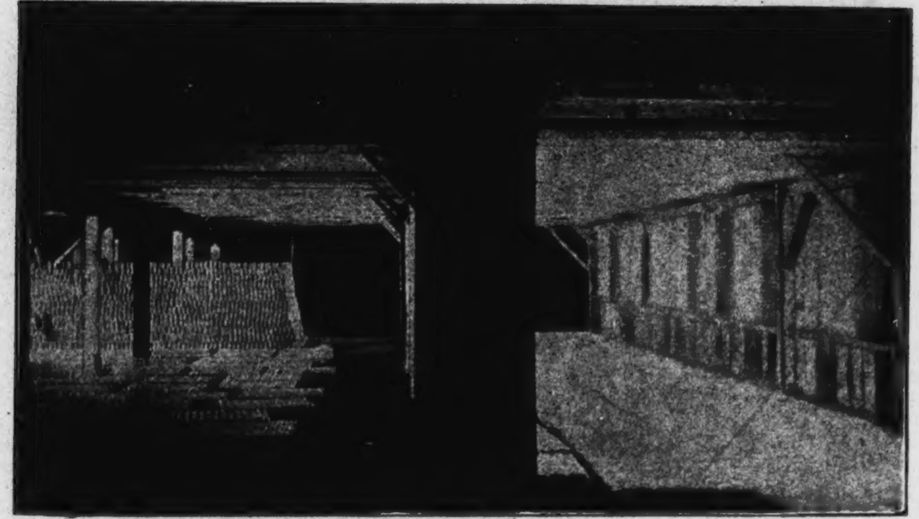
Most canneries use filling machines, but as these machines are covered by a patent owned by one of the large packing organizations they are difficult to obtain. One filling machine will fill 800 cases per day, and the larger canneries have from two to three, and, exceptionally, four filling machines. At some of the smaller canneries filling is done by hand. These are usually establishments that have a capacity of from 400 to 600 cases per day. The machines are only adapted to what is known to the trade as "talls"—that is, the ordinary high 1-pound can. All fancy cans, such as "flats," elliptical, half-pound, etc., are filled by hand.

The filling machine consists of a receiving platform, on which the empty cans are fed, each one reaching a distinct position in its turn. One man at the filling table overhead feeds the divided fish into a hopper, from which it is conveyed to the can underneath, and by a gentle pressure of a piston is pressed into the can, when a movement of the machine conveys the filled can to a table and an empty can into position to be filled. The movement is so rapid that a continuous stream of filled cans is poured on the table. Here the filling is inspected, and, if for export, the cans are carefully weighed, so that there may be no short weight. If they are not quite full a small quantity of fish is added, a supply of small bits being kept at hand for this purpose.

Retorts and test kettles.

The can is now ready for the top, which in some canneries is put on by hand, but in most cases by a machine. The cans are placed in line and conveyed by a belt to a machine, the tops being fed in through a separate aperture. As the cans emerge with the tops on, a crimping attachment presses the edge firmly around the body, and as it is still carried by a belt, it is turned by the movement of the belt on its side and rolls down a trough to the soldering machine. Here an endless revolving chain passes over the can near the top and rolls its edge into the molten solder. As it emerges from the soldering machine it rolls down a trough and under several jets of water to cool, and as it comes from the trough it is placed on a table where Chinese seal by hand the central vent, which was left open in the capping process and in the soldering machine, where it becomes quite hot, to let the air escape.

After the central vent is closed the cans are placed vertically in single layers in large open-work trays made of heavy strap iron and holding two cases. The filled trays are now lifted by tackles and iron tongs and lowered into a square wooden tank filled with water heated by steam. This is the first test for leaks. The experienced eye of the Chinese tester at once detects a faulty can by the escape of air, and the can is removed with a pair of tongs and placed aside, where one or more solderers remedy the defects. After removal from the hot-water test the trays are placed one on top of another on cars, and are carried by a railway into the retorts for the first cooking.



Cooling a day's pack.

The cooking is all done by steam in a part of the cannery called the "bath-room." In some canneries the retorts for first cooking are made of heavy plank, well bolted to resist the steam pressure, but in most places they are made of iron or mild steel plate. In the early days the cooking process was a grave secret and none but those interested in the cannery were intrusted with it.

The time of cooking differs somewhat in different canneries, according to the ideas and experience of the superintendent. It is desired to not only cook the fish, but the bones must be cooked so they will crumble between the fingers, as if this is not done the contents may spoil. In some establishments the canned fish is 60 minutes in each retort, in others 50 minutes in the first and from 70 to 80 minutes in the second.

The trays with the hot, steaming cans, bulged out at the ends by the steam within, are then placed on tables where the bath-room men test the cans by the process known as "blowing" or "venting." These men, armed with small wooden mallets, having on the broad face an awl-like point, tap rapidly the top of one can after another, making a small perforation in each. A fountain-like jet at once appears, caused by the steam escaping, and carrying with it some of the liquor. The vents, after blowing, are immediately soldered and the trays run into the second retort for final cooking. The reason for the two separate cooking operations is that if the cans are kept in the first retort a sufficient length of time to complete the cooking, the steam generated would be so great in the cans that they would be ruined.

At one cannery inspected, where it seemed that more attention was given to exact details of cooking than in some others, there was on the top of the retort a thermometer, connected with the interior, and a separate steam-gauge. The cans to be cooked were placed in the retort, the doors securely clamped, and the steam turned in. The steam gauge was carefully noticed until it showed 6 pounds pressure, where it was maintained, by regulating the stop valve, until the thermometer registered 220° F. The temperature was kept at this point for thirty minutes, when the retorts were opened and the cans removed.

Lacquer room.

The second cooking at this cannery is as follows: After the cans are placed and the doors secured, steam is admitted until the independent gauge shows a pressure of 12 pounds. It is then maintained at that pressure until the thermometer registers 240°, when the temperature is regulated to 240° for 45 minutes when cooking redfish, or 60 minutes when cooking cohoes. The latter fish are quite large at this cannery, and presumably the longer period is given so that the large bones may be thoroughly cooked. In both cases of cooking, after the desired temperature is reached the pressure falls, while the temperature is held at the proper point.

After the cans are taken from the second retort the grease and dirt on them are removed by a lye bath, the lye is next removed by a fresh-water bath, and the cans are ready for the cooling room. After cooling they are lacquered by placing them on a tray in an inclined position, which is lowered into the lacquer contained in a rectangular wooden tank, lifted, drained, and removed. When the lacquer is dry the cans are labeled and cased.

After the second cooking they are twice tapped for leaks. Certain Chinese are very expert at this test. With a tenpenny nail they pass rapidly over the cans, striking the top of each, and judge by the sound whether there are any defects.

During the process of canning imperfect cans are found by inspection and testing, and if repaired before the first cooking and immediately processed they are naturally in the same condition as if there had been no defects. If the leaks are discovered after cooking and are repaired at once and the contents recooked, they are still very good, the only difficulty being that by blowing them a second time they lose weight. The above goods usually go in with the regular pack of their kind and are not classed as regular "do-overs."

When a cannery is running to its full capacity defective cans can not be repaired and recooked at once, and are set aside sometimes for days before they are recooked, the result being that decomposition follows, the same as with any other meat that is exposed to the air, and the fish becomes unfit for food. When recooked the fish is mushy, and the blowing makes the cans very light, which is frequently corrected by adding salt water. This, the "do-over," is the lowest grade of goods, and is fit only for chicken food. Such cans are frequently sold to brokers without labels, or else labeled with the name of some fictitious cannery, and find their way into country, lumber, mining, or negro districts, or are sent to the South Seas and semibarbarous localities. Defective cans run from 1½ to 2½ per cent of the output, and those intended to go with the regular pack are usually vented by opening one of the first vents, or the seam at the top, so that additional vent marks may not lead to suspecting the goods.

WEIGHT OF FISH.

Cannery people, in referring to the weight of salmon, always speak of so many to the case. They never weigh the fish, but estimate them by the case, and sometimes make fishing contracts in that manner. This naturally involves another subject: How many live fish are required to make a case of 48 one-pound cans? Much depends upon how the fish are cut. The largest company doing business in Alaska cuts off a considerable portion of the tail and the head well back as waste. Another cannery saves these end pieces and packs them under special labels. A liberal estimate of the loss in cleaning and preparing the fish for the cans is one-third, which would be about 75 pounds of live fish to a case, or 72 pounds if each can contained exactly 1 pound; but as the cream of the pack goes to foreign markets, the cans are always slightly overweight, about an ounce, to prevent a rebate on short weights. My own observation and inquiry among canners who seemed to have given the subject some attention lead me to believe that 65 to 68 pounds of live fish will make a liberal case, depending somewhat on the size of the fish. Fish that run 10 to 12 to the case can be gauged very closely on a 65-pound basis, but for smaller fish this must be increased.

The waste of redfish and cohoes at the canneries is not large, but with humpbacks many are culled out, either on account of being very small or in bad condition. This species, late in the season, when the hump commences to be marked, becomes watery, and it is then difficult to properly fill a can, as much of the weight is in liquor, which blows off in testing, causing light weight. Under average conditions from 10 to 15 per cent of humpbacks are wasted, and in a season when they are as plentiful as in 1897 as many or more are wasted than are packed. Some years ago, when only a few humpbacks were packed, they were so numerous in Naha Bay that tens of thousands were hauled on the banks and left to decay in order to thin them out.

LABELS AND BRANDS.

Every cannery in Alaska has its own labels and brands, and the same fish are packed in each cannery under various brands. One cannery that was visited had seventeen. The reason for employing so many is briefly as follows: When the canneries were first operated independently each adopted various brands for the same species of fish, and they were introduced into different sections, ultimately creating demand for particular goods.

In spite of these various brands, the highest-grade goods in all, or nearly all, the Alaska pack has some word which conveys to the consumer what is in the tin, if he knows the key. The few cans of king salmon that are packed have the words "king" or "Alaska king" somewhere on the label, but these fish form so small a part of the Alaska pack that they can hardly be considered. The labels for redfish, which forms the great bulk of the pack, as a rule have the word "red" in some connection, such as "red salmon," "choice red salmon," "Alaska red salmon," etc. In some canneries a few of the early cohoes find themselves under a redfish label, but usually a can marked "red salmon" contains that fish.

The cohoes, and frequently the white king salmon, are usually packed under a label that somewhere has the words "spring salmon" on it, and the humpback is covered by the term "pink salmon." The few dog salmon packed are covered either under "pink salmon" or else go in with that heterogeneous mass of tips-and-tails, light-weights, "do-overs," etc. Some of the canneries have not adopted this system of labeling, but with about three-fourths of the Alaska pack the words "king," "red," "spring," and "pink," are used, as just mentioned.

The names of companies which have never had any real existence are sometimes found on labels. Some of these are the Prince of Wales Packing Company, Tolstoi Packing Company, Clarence Straits Packing Company, Moira Packing Company, Coal Bay Packing Company. These are simply names that some years ago were placed on labels of which a few are still in use. They are supposed to represent fish taken at the several localities, but no canneries were ever located at those places or operated under the company titles.

As elsewhere noted, fictitious cannery names are also used to cover "do overs."

MARKETS.

The larger part of the canned redfish goes abroad, principally to England. These are the choicest of the pack, and more than usual care is observed in preparing them, as the European market demands a high grade of goods. The cans are carefully weighed, and contain about 1 ounce more than a pound, so as to be sure to avoid light weights. The cans are carefully inspected for dents or defects, and the fish are the very best. It is usual on European orders to open a certain number of cases and average the order from an inspection of these cans. If they are defective, reclamation is made. The remainder of the pack of redfish, together with the cohoes, humpbacks, dog salmon, tips-and-tails, and do-overs remain in the home market, and some are shipped to Australia, South America, and the South Seas.

PRICES OF CANNED SALMON.

The prices vary with the demand. On account of the large output in 1897 canned salmon that year sold very low. A good average price for the 1896 output was, for king salmon, $1.15; redfish, 90 cents; cohoes, 80 cents, and humpbacks, 65 cents per dozen cans. The prices paid during the winter of 1897–98 were, king, $1.10; redfish, 85 cents; cohoes, 75 cents, and humpbacks, 55 cents per dozen. These are simply averages from first hands in large quantities. One large organization, it is reported, sold 300,000 cases of the best redfish on foreign order, before the pack was made, at 83 cents per dozen. The other grades are sold for what they will bring.

CANS AND BOXES.

It is difficult, without seeing, to appreciate the enormous number of cans used in a cannery. From the time of the arrival of the employees at the cannery, six or eight weeks before the salmon run commences, the Chinese who do the packing are employed in making cans, as their contract calls for the packing work complete, from the making of the cans to the stowing of the labeled, filled cans into the cases.* The body of nearly all cans is made by hand, but there are a few machines in use that solder the long body seams. In nearly, if not quite, all the canneries, after the cans are filled the bottoms and tops are soldered by machinery. To pack 50,000 cases requires 2,400,000 cans, and the Alaska pack in 1897 took about 43,600,000 cans. This requires about 100,000 boxes of tin plate, weighing 10,000,000 pounds (5,000 tons roughly) and costing about $400,000. The tin plate used at present is what is known as 100-pound tin for the body of the can, and 95-pound tin for the tops. It takes about 110 boxes of tin plate for 1,000 cases. Domestic tin is largely used for the pack sold for home use, but imported tin for the export pack. Formerly all tin plate was imported, and what is known in the trade as 110-pound and 112-pound tin was used.

One box of 100-pound tin, 14 inches by 20 inches, English plate, contains 112 sheets of tin plate, weighing 100 pounds, or with the box 5 pounds additional. One box of 95-pound tin of the same dimensions contains 112 sheets of tin plate, weighing 95 pounds net, or with the box 5 pounds additional. The quotations in December, 1897, in San Francisco, on lots of 500 boxes or more, duty paid, were $4.20 per box for 100-pound tin and $4.10 for 95-pound tin. American plate is the same except in price, which at the time the imported tin quotations were made was for 100-pound tin $3.425, and for 95-pound tin 10 cents less per box, delivered f. o. b. San Francisco in large lots. One-fourth of 1 per cent is said by dealers to cover all deterioration due to rusting, sweating, etc.

For the season's pack it is usual to allow 110 boxes of tin to 1,000 cases of cans. This makes an allowance of 2½ to 3 per cent for rusty plates, losses due to imperfectly cut sheets, and for other cannery uses, as the following will show: One sheet 14 inches by 20 inches will cut 6 bodies or 24 tops of 1-pound tall cans; 1,000 cases, or 48,000 cans, contain 96,000 tops (4,000 sheets) plus 48,000 bodies (8,000 sheets) equal to 12,000 sheets, which is 107⅐ boxes, or 107 boxes and 16 sheets. Hence 112 sheets, 14 inches by 20 inches, will make 448 tall 1-pound salmon cans, or 1 box of tin plate will make 9⅓ cases of cans. In canneries generally it is said that actual experience shows that

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* In Bering Sea packing commences soon after the ice permits the vessels to enter the estuaries. As a rule, empty cans are carried from San Francisco to these canneries.

1 box of tin will make only $9\frac{1}{6}$ cases, at which rate it will take $109\frac{1}{10}$ boxes of tin to 1,000 cases.

There is a rebate of 99 per cent of the duty on imported tin used on the export pack, but under the present ruling every box must be accounted for, and it is said that under these conditions only about 75 per cent is realized on account of the inability to account for the disposition of every box.

The boxes in which the canned salmon is packed in Alaska are mostly made in Puget Sound and carried up in shooks. The cannery at Metlakahtla turns out its own boxes, and the sawmill in Tongass Narrows, operated by Metlakahtla Indians, supplies Loring and Wrangell. As lumber can not legally be exported from Alaska, there is only a small local demand for the product of the sawmills.

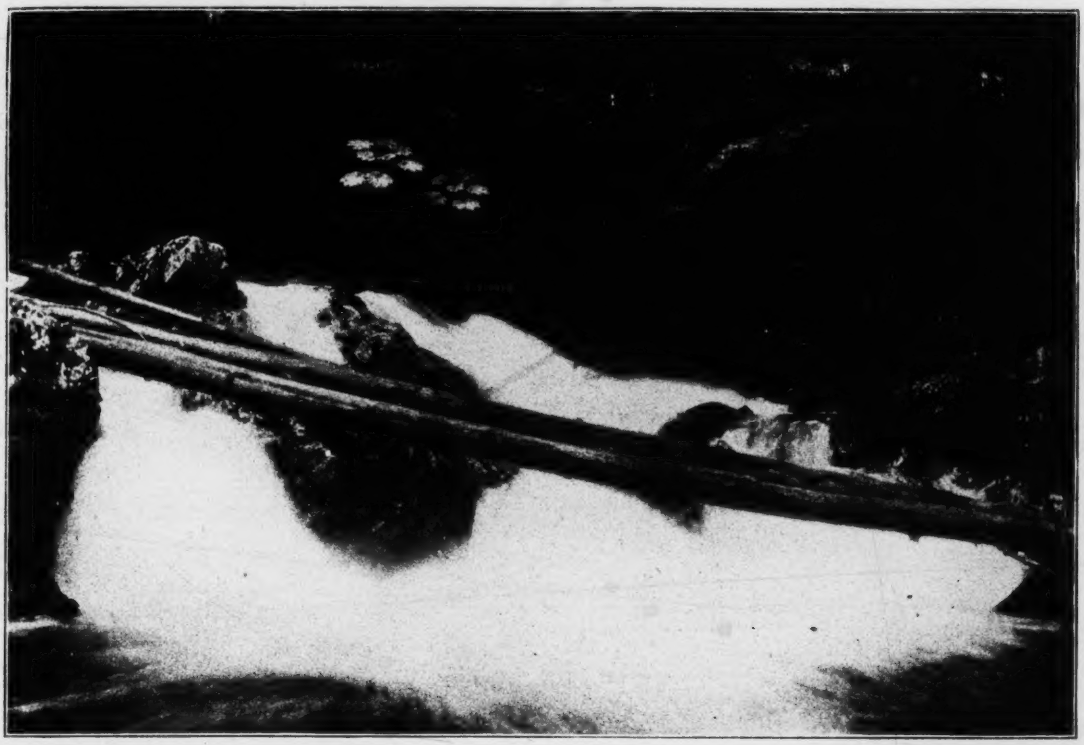
DEPLETION OF STREAMS.

When a person interested in a cannery is questioned regarding the decrease of salmon in Alaskan waters, he is likely to assure you at once that there are just as many salmon in the streams as there ever were, and begins his proofs by citing years like 1896, when there was a large run of redfish in Alaska; but any disinterested authority on the subject will say that the streams of Alaska are becoming depleted. While it can hardly be said that the streams will fail entirely within a few years, there is no doubt that the average runs show fewer fish year by year, and if the laws are not amended and *enforced*, the time will come in the not very distant future when the canneries must suffer through their own actions.

It is a difficult matter to furnish convincing proofs to those who do not wish to be convinced, and any argument may fail with those who are interested commercially. It is also difficult to establish proof by statistics, because accurate stream statistics, as a rule, can not be obtained; and, as to packs, the canneries have multiplied in numbers, and many of them have been so enlarged that no comparison can be made. The causes of the depletion are the barricading of streams and overfishing; in other words, *illegal* fishing.

In the examinations of the various streams, as outlined in the following pages, all resources have been exhausted to obtain data showing their past and present condition. It must be evident to anyone referring to the records of the streams that they are furnishing fewer fish than formerly, in spite of the improved gear and appliances. The results of barricading are illustrated in such streams as Karta Bay, Naha Bay, Yes Bay, Klawak, Redoubt, and many others in southeast Alaska; in the streams of Prince William Sound district, on Afognak Island, and at Chignik. The illegal obstruction of streams by barricades is more apparent in southeast Alaska than elsewhere because the streams are small, there are many of them, and they are easily closed; but from all reports made to me, even by cannerymen, the district of Prince William Sound is and has been more heavily barricaded in proportion than southeast Alaska.

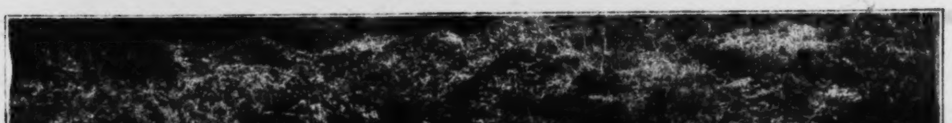
The following may be some evidence bearing upon the subject of depletion: Taking, for instance, a section of southeast Alaska, from Behm Canal and Prince of Wales Island south and east, in 1889 four canneries were operated, viz, Loring, Burroughs Bay, Ketchikan (burnt that year, but packed 13,000 cases), and Yes Bay. In 1897 four canneries also operated, viz, Loring, Yes Bay, Metlakahtla, and Quadra. In 1889 the packs were made from the streams near the canneries—that is, from the "home streams"—and nearly all were redfish, with a few cohoes and probably very few hump-



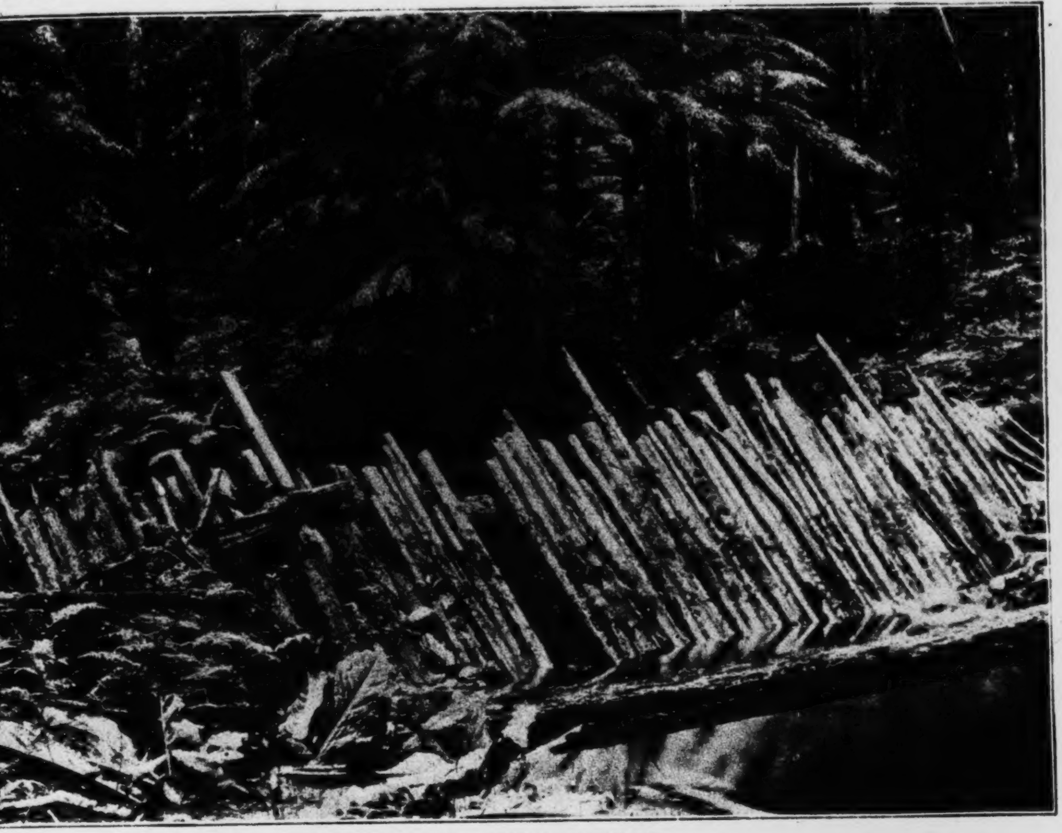
WEST BRANCH OF SKOWL ARM.

BARRICADE IN WEST BRANCH OF SKOWL ARM.

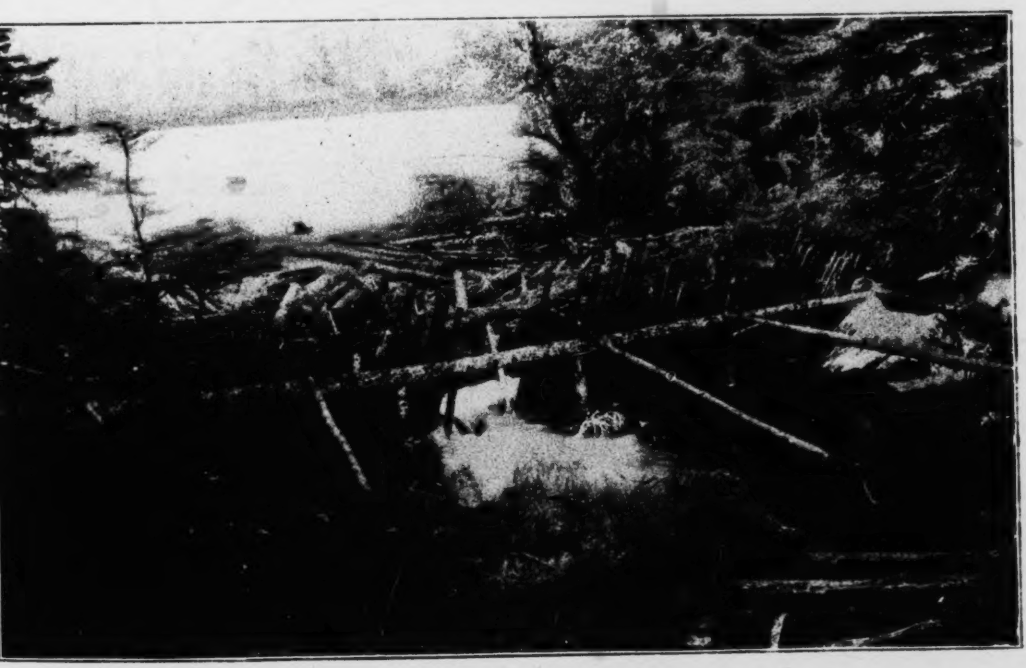
BARRIER IN SALMON STREAM AT HEAD OF NICHOLS BAY.



BARRICADE IN SALMON STREAM, NEAR HESSA.

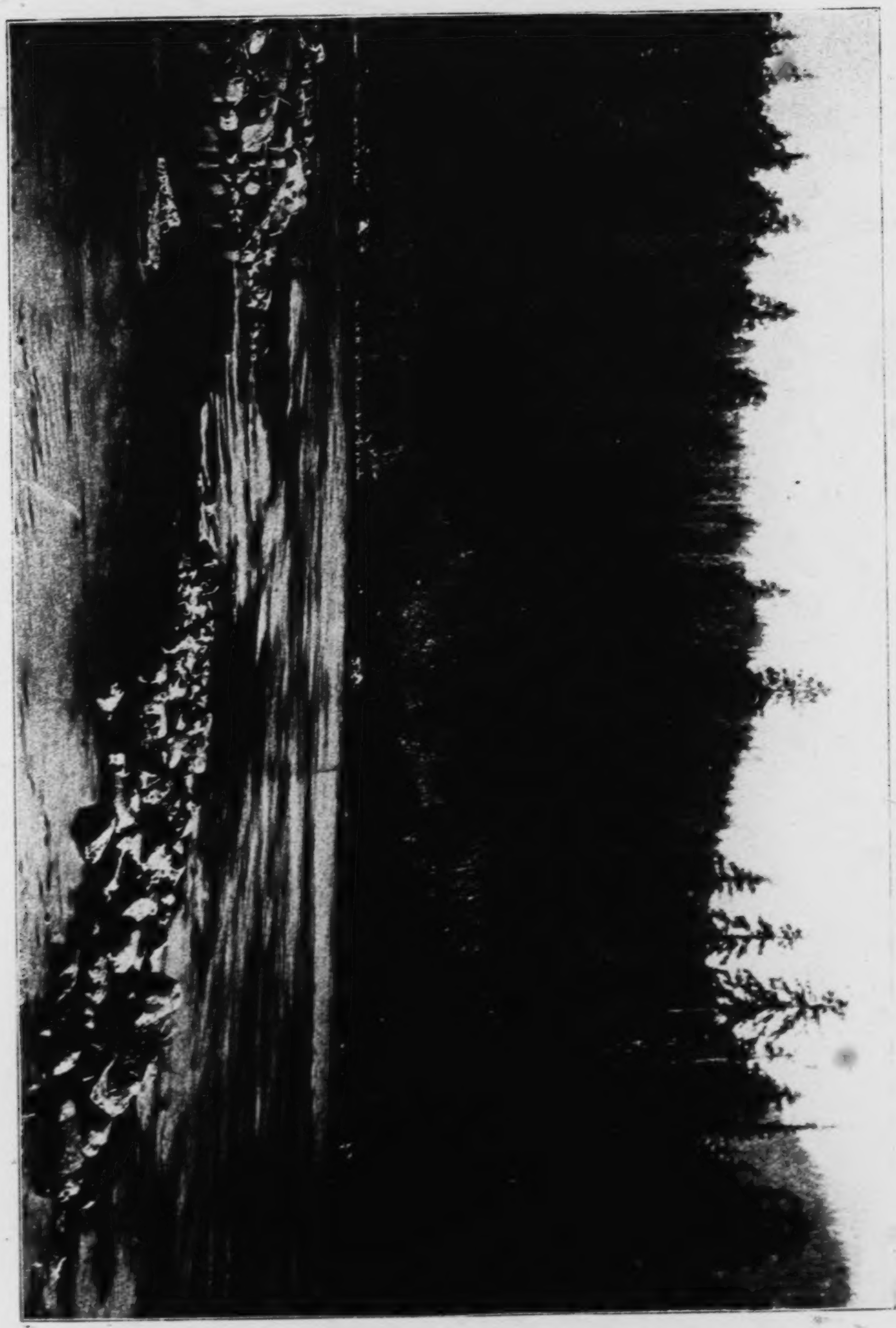


SECOND BARRIER IN STREAM AT HELM BAY.

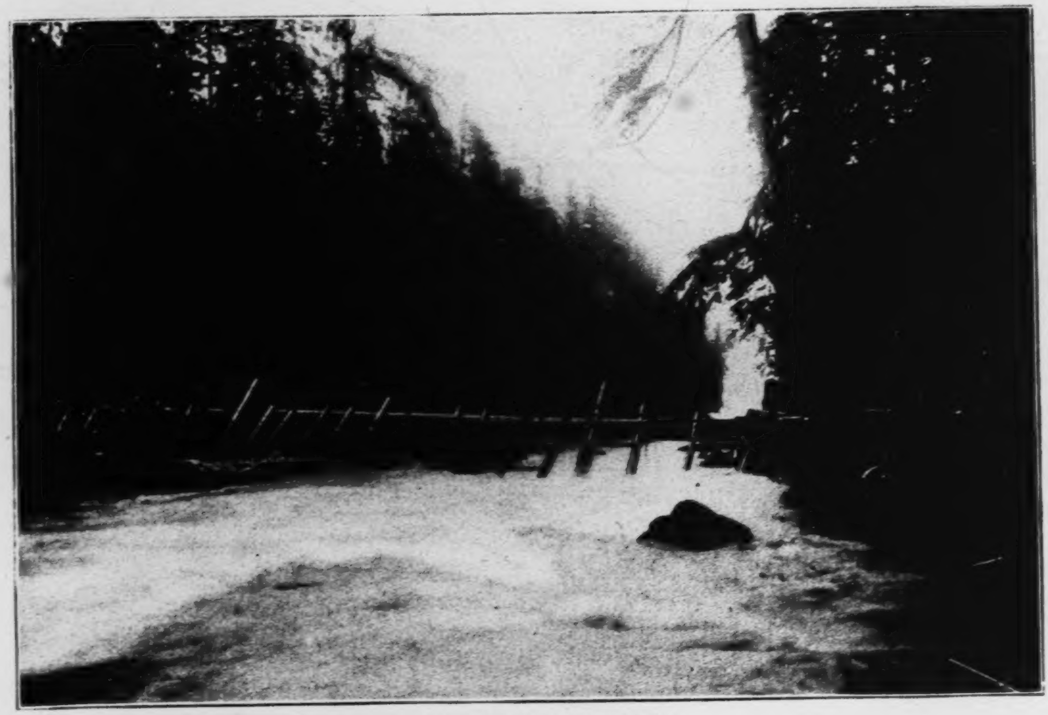


DAM IN OUTLET TO LAKE, REDFISH BAY.

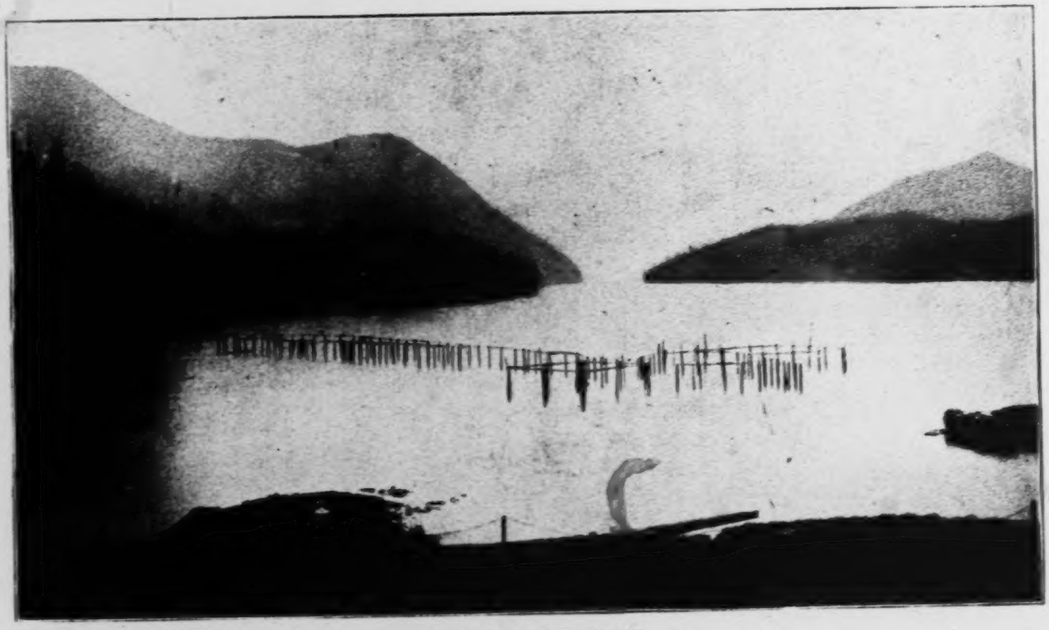
BARRIER IN STREAM AT HELM BAY.



OLD FISH-LEAD IN STREAM AT KARTA BAY

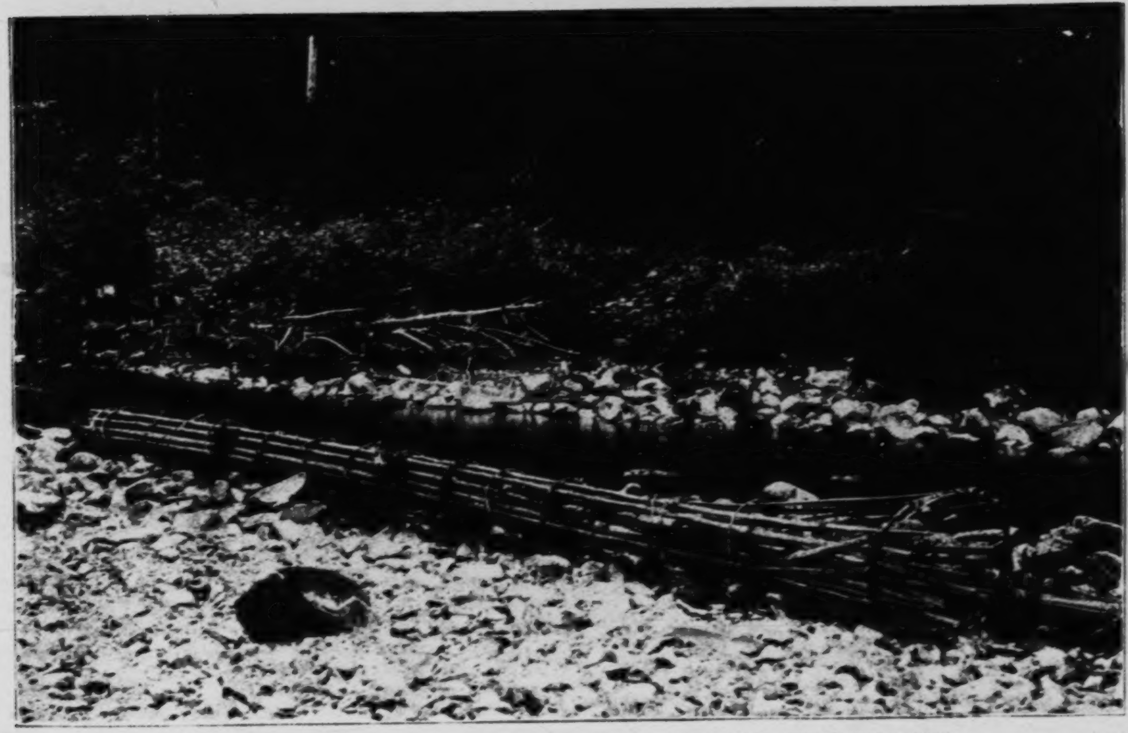


BARRIER IN STREAM AT McDONALD BAY.

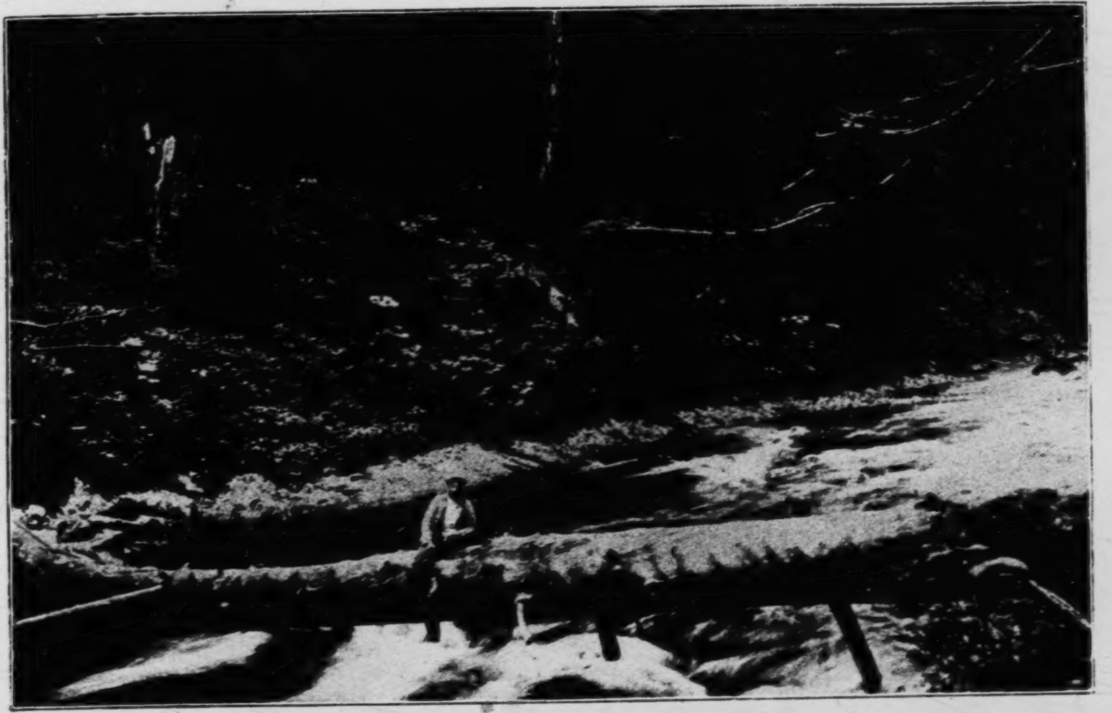


FISH-TRAP IN McDONALD BAY.

BARRIER IN STREAM ENTERING FIRST INLET, SOUTH SIDE OF MOIRA SOUND.

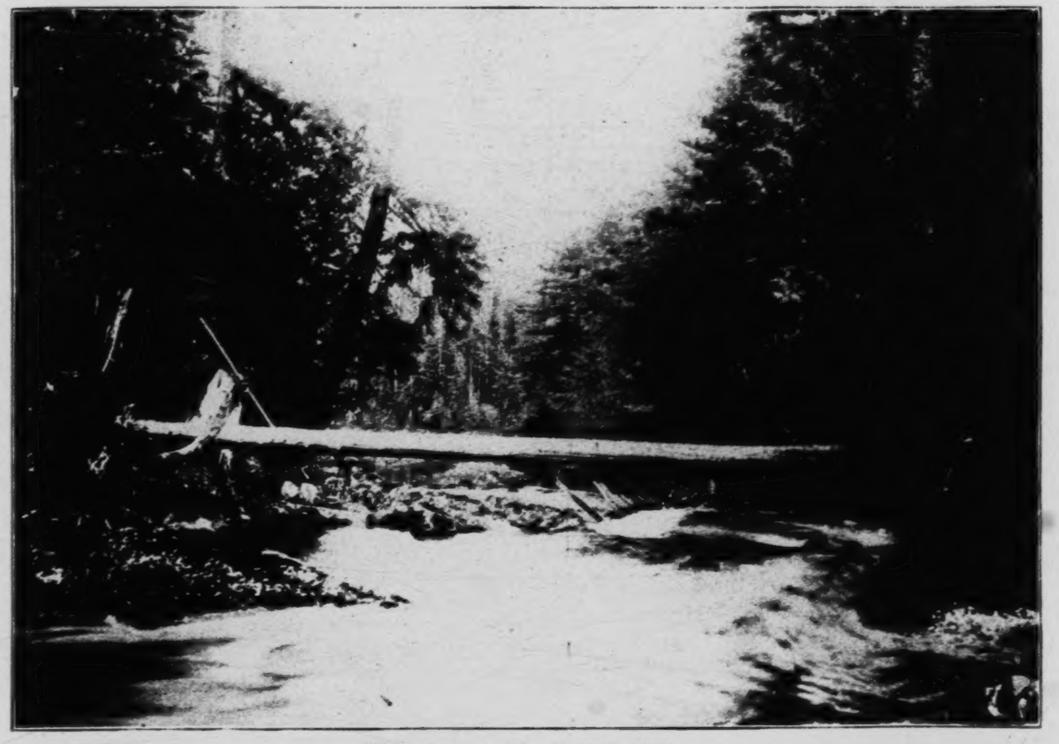


INDIAN FISH-TRAP AND ARTIFICIAL CHANNEL IN STREAM, FIRST INLET, SOUTH SIDE OF MOIRA SOUND.

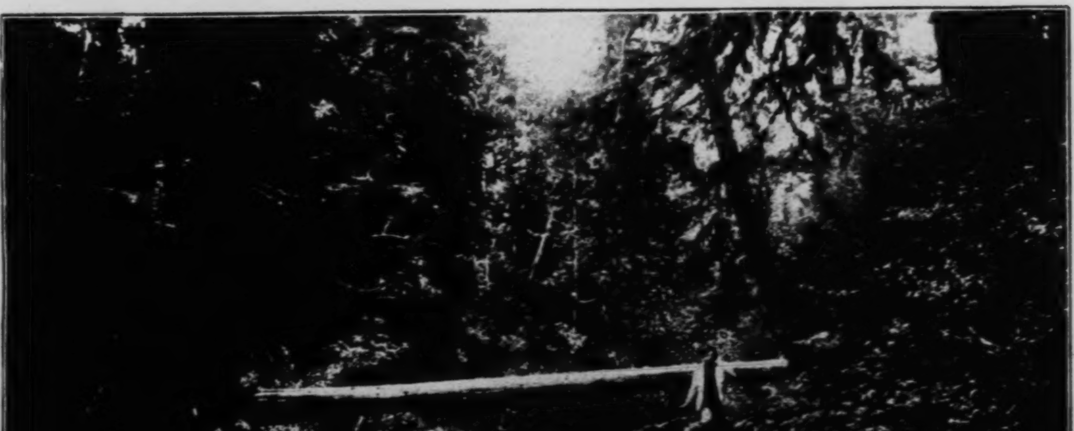


BARRIER ACROSS STREAM AT NORTH ARM, MOIRA SOUND.

OLD BARRIER FENCES AND INDIAN FISH-TRAPS, KARTA BAY.



OBSTRUCTION AT KLAKAS, FROM ABOVE.



OBSTRUCTION AT KLAKAS, FROM BELOW.

backs, for the latter were not in favor and few were packed. In 1897 the pack for the same section is double the 1889 pack, but they are nearly all humpbacks. The pack of redfish is certainly very much less, yet *all* the streams within 70 or 80 miles of the canneries have been scoured with all the gear that could be devised or used.

Probably nowhere is the depletion more noticed than in Copper River Delta and Prince William Sound district. In 1890 the two canneries used 20 boats, each with 150 fathoms of web, besides seines, and fished Mountain Slough, Eyak Lake and River, and Algonek and Glacier sloughs in the delta, and Miner River and Cheniga in Prince William Sound. In 1897, to make a slightly increased pack, one cannery used 32 boats, the other 43, all with 450 fathoms of web to a boat, and they fished all the streams from Chilkhat River to Eyak in the delta, and all the streams in Prince William Sound. There is no doubt in the minds of the people of Prince William Sound that the streams are being depleted.

Redfish hatchery at Karluk.

At Karluk, in spite of the great run of 1896, it is conceded that the average run is smaller than in the early days of fishing off this river.

At Chignik, from 1890 to 1896, an average of 61,400 cases per year were packed from that stream by one organization. In 1896 three separate canneries, with all their forces and every effort they could make, only packed about 65,000 cases of Chignik fish; and in 1897, by doubling their efforts, they reached a pack of 74,159 cases. Anyone who sees the fisheries at Chignik will readily understand that the stream can not stand the excessive fishing.

It was a matter of great surprise to discover, as the investigations progressed, the large number of streams which were either actually barricaded, or which showed indications of having been barricaded, notwithstanding the strict law forbidding such obstructions, the maximum penalty being $1,000 fine, three months' imprisonment, and a fine of $250 per day for every day the obstruction remains.

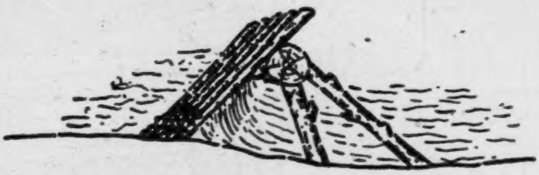
When the attention of those known to have an interest in keeping the salmon streams in a normal condition has been called to the existence of barricades, with the expectation of having them join in protests against their construction, it has been surprising to hear some defend barricading as right, and the belief has been inevitable that if such persons were not directly concerned, they at least encouraged these practices. The statement was made in certain localities that it is impossible to obtain sufficient fish to compete with other canneries without barricading. This is very true, but the argument is absurd, and needs no comment. Equally absurd defense of barricades was made in other parts of Alaska.

The effect of barricades can be readily appreciated. Salmon come to the streams to ascend for spawning at certain dates, from which there is little variation. At first a few stragglers appear, then small schools, and the schools grow larger and larger as the season advances. At the mouths of the streams the fish accustom themselves to the new conditions in brackish water, and if the river is open to their passage they soon ascend to the lakes and thence to the spawning-beds. A whole school has been known to ascend in one night. If the stream is barricaded, preventing their ascent, they school around in the bay or inlet at the approaches of the streams, may apparently leave the vicinity for a short time, and then return and repeat this process many times. While thus schooling in the salt water they do not reach a spawning condition so rapidly, and continue suitable for canning a longer time. Some of the fish that are more advanced toward the ripening period, in their frenzy to get to the spawning-grounds, fairly attack the obstruction and have been known to dash themselves against the timbers with such force as to be killed or die of exhaustion caused by the repeated attacks. Briefly, the barricades corral the fish, and thus permit the fishermen to catch all at little expense; they are also said to keep them from ripening rapidly, and thus permit the cannerymen to pack good-quality fish much later in the season. This seems to be shown in the 1896 catch at Hetta, where—not from the action of barricades, but because the fish, on account of the extreme low water, could not ascend until the late September rains raised the water—over 40,000 redfish were taken between September 1 to 20. It is claimed that after the fishing season is over some of the rails of the barricade are knocked out to allow the remaining stragglers to pass through, but this is doubtful.

The defenders of barricades state that when the water in the rivers is high it flows over the ends of the rails, and some redfish leap the barrier, while the other species and the trout are kept out, and thus the eggs of the redfish are preserved. But the barricades are generally so constructed that if a few fish find a passage the same proportion of one species passes in as another.

The origin of barricading Alaska salmon streams dates back to a period prior to the acquisition of Alaska by the United States. The Russians built "zapors" or dams with stone piers across the streams, near the settlements, from which they drew their salmon supply. The ruins of some are still standing, at Redoubt, Afognak, and other places. The injury these zapors caused to the fisheries is acknowledged by everyone who has any knowledge of the subject. The Russians doubtless received the idea of barricading the streams from the Indians. When the first fisheries for the canneries were organized, "these little Indian devices," as they were called by a person interested in Indian education, were in use, and in some instances were so ingeniously arranged that the fish were carried out high and dry into a basket. At one place (Klawak) an Indian owner of a stream used to boast that his trap was so cleverly arranged that not a fish could get up the stream; that he caught them all. It is said that the Indians appreciated the necessity of allowing the fish to ascend the streams to spawn, and therefore after obtaining their winter supply they opened the barricades. That barricading has been done in recent years by the Indians there is no doubt, for in a number of instances evidences of recent barricading were found on streams presumably fished by Indians only. If the law were translated into Chinook, printed on muslin, and posted in every Indian village and explained to the natives, it would have an excellent effect.

The general form of these barricades is the same, and a description of one in Nichols Bay stream, Prince of Wales Island, may answer in a general way for all. The barricades extend solidly across the stream, and the best idea that can be gained of this construction is by reference to the illustrations accompanying this report. They are located near the high-water mark and, if possible, at a point where a pool is formed immediately below the obstruction. A tree, 2 or 3 feet in diameter, is felled across the stream, and then cut to a proper length so as to make a log that reaches from bank to bank and from 4 to 6 feet above the surface of the stream. This log is then jammed and wedged into the rocky ledges on each side of the banks, supported underneath to pverent it from sagging, and braced from the downstream side by heavy beams to resist the great pressure brought by the floods. Straight saplings, 18 to 20 feet in length and 3 to 4 inches in diameter, are cut, sometimes split lengthwise, and laid in the direction of the stream over the log, the butts embedded in the river bed upstream and covered with the river deposit, and the lower ends projecting over the log several feet. These split rails are laid solidly side by side from bank to bank. The water at ordinary stages flows through the interstices, and in heavy floods over the ends.



End view of barricade, showing method of construction.

The barricades are usually so solidly built that they resist the ordinary drift, and at most have but a few rails, which are easily replaced if knocked out. Frequently a second tree is partly cut, so as to have it ready in case of accident to the barricade. Such was the construction of the one at Nichols Bay stream, and in addition, at one side where there was a branch, a wire netting was stretched across.

It is readily seen that the fish in passing upstream go under the log and are prevented from further ascent by the rails, and as their spawning instinct keeps them heading the current, they remain in the vicinity and are easily captured. This barricade was so solid that not a fish could pass through; it is probable, however, with a full stream and the water pouring over the end, that a few salmon following the stream may leap the end rails. To prevent this there is sometimes an effective addition in the shape of a galvanized iron wire netting stretched across the top in the direction of the log, from bank to bank, to catch the strays that might succeed in leaping the barrier. In some instances, instead of the split rails, there are heavy rails laid upstream, about 4 feet apart, and over these are secured light frames of openwork like the lathing of a lobster pot, but heavier, through which the water can flow while excluding the passage of fish.

THE ALASKA SALMON LAW.

The following act, passed June 9, 1896, relating to the salmon fisheries of Alaska, is the one now in force:

AN ACT to amend an act entitled "An act to provide for the protection of the salmon fisheries of Alaska."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the act approved March second, eighteen hundred and eighty-nine, and entitled "An act to provide for the protection of the salmon fisheries of Alaska," is hereby amended and reenacted as follows:

That the erection of dams, barricades, fish wheels, fences, or any such fixed or stationary obstructions in any part of the rivers or streams of Alaska, or to fish for or catch salmon or salmon trout in any manner or by any means, with the purpose or result of preventing or impeding the ascent of salmon to their spawning ground, is declared to be unlawful, and the Secretary of the Treasury is hereby authorized and directed to remove such obstructions and to establish and enforce such regulations and surveillance as may be necessary to insure that this prohibition and all other provisions of law relating to the salmon fisheries of Alaska are strictly complied with.

SEC. 2. That it shall be unlawful to fish, catch, or kill any salmon of any variety, except with rod or spear, above the tide waters of any of the creeks or rivers of less than five hundred feet width in the Territory of Alaska, except only for purposes of propagation, or to lay or set any drift net, set net, trap, pound net, or seine for any purpose across the tide waters of any river or stream for a distance of more than one-third of the width of such river, stream, or channel, or lay or set any seine or net within one hundred yards of any other net or seine which is being laid or set in said stream or channel, or to take, kill, or fish for salmon in any manner or by any means in any of the waters of the Territory of Alaska, either in the streams or tide waters, except Cook Inlet, Prince William Sound, Bering Sea, and the waters tributary thereto, from midnight on Friday of each week until six o'clock antemeridian of the Sunday following; or to fish for or catch or kill in any manner or by any appliances, except by rod or spear, any salmon in any stream of less than one hundred yards in width in the said Territory of Alaska between the hours of six o'clock in the evening and six o'clock in the morning of the following day of each and every day of the week.

SEC. 3. That the Secretary of the Treasury may, at his discretion, set aside any streams as spawning grounds, in which no fishing will be permitted; and when, in his judgment, the results of fishing operations on any stream indicate that the number of salmon taken is larger than the capacity of the stream to produce, he is authorized to establish weekly close seasons, to limit the duration of the fishing season, or to prohibit fishing entirely for one year or more, so as to permit salmon to increase: *Provided, however,* That such power shall be exercised only after all persons interested shall have been given a hearing, of which hearing due notice must be given by publication: *And provided further,* That it shall have been ascertained that the persons engaged in catching salmon do not maintain fish hatcheries of sufficient magnitude to keep such streams fully stocked.

SEC. 4. That to enforce the provisions of law herein, and such regulations as the Secretary of the Treasury may establish in pursuance thereof, he is authorized and directed to appoint one inspector of fisheries, at a salary of one thousand eight hundred dollars per annum; and two assistant inspectors, at a salary of one thousand six hundred dollars each per annum, and he will annually submit to Congress estimates to cover the salaries and actual traveling expenses of the officers hereby authorized and for such other expenditures as may be necessary to carry out the provisions of the law herein.

SEC. 5. That any person violating the provisions of this act or the regulations established in pursuance thereof shall, upon conviction thereof, be punished by a fine not exceeding one thousand dollars or imprisonment at hard labor for a term of ninety days, or both such fine and imprisonment, at the discretion of the court; and, further, in case of the violation of any of the provisions of section one of this act and conviction thereof a further fine of two hundred and fifty dollars per diem will be imposed for each day that the obstruction or obstructions therein are maintained.

This law, like others that have preceded it, is generally regarded as inadequate in some vital respects by those having the interest of the salmon fisheries at heart; but there is little agreement among cannery people as to what the law should be. There is, however, a general inclination toward a tax on the output of each cannery and saltery for the support of hatcheries, and the suggestion that streams be leased for a term of years has everywhere met with favor.*

It must be admitted that the laws and regulations pertaining to Alaska salmon fisheries are very generally disregarded, and that they do not prevent the illegal capture of fish. There is one case in which the law is likely to be respected, and that is when rival canneries, fishing in the same locality, are not mutually benefited by its non-observance.

In conversation with the superintendent of one cannery it was remarked that, so far as experience and observation went, it was exceptional to find a cannery that did not pack some fish taken illegally. He seemed very much surprised, and desired to impress upon me that in that district the law was observed. Ten minutes afterwards he acknowledged that they did not observe the weekly close season, and the following day it was learned that one stream fished by this cannery was filled with nets from mouth to source, and that in the lake at the head of another stream there was a trap planned by the foreman of the cannery.

It is probably true that fish are sometimes carried to canneries that have been taken illegally without the knowledge of the superintendent, for the reason that, excepting the home stream, he does not see much of the fisheries, as his time is taken up with the canning operations. In general the cannerymen would like to see the law enforced if it could be done impartially. While in a minor degree the law may be defective, and, owing to the varying conditions found in the vast extent of territory involved, may need amending, still it is good as it stands, and for the present it only needs enforcement, and this is not a difficult matter if the proper steps are taken. Without considering the large amount of money invested in the salmon fisheries of Alaska, the output is worth in round numbers $3,000,000 a year. Should not such an industry be fostered and properly protected?

Reference is made to the reports of the salmon inspectors published by the Treasury Department to show the nature of the work performed by these officials and the obstacles they encounter in the performance of their duties.

My own criticism of the law is briefly as follows: It was evidently framed upon the basis that the salmon fisheries of Alaska were confined to large rivers like the Columbia and Fraser, while the fact is that 70 per cent of the Alaska pack is taken from around the mouths of comparatively small streams, and each stream presents certain peculiarities, so that it is difficult to protect the fisheries by a general law, and it must be left to departmental regulations.[*]

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* In April, 1898, the Secretary of the Treasury sent a letter to the House of Representatives in which amendments to existing laws were proposed as follows and for the reasons stated:

The present salmon-fisheries laws have been found inadequate to meet existing requirements, and their amendment along the line of the inclosed bill is recommended in the light of subsequent investigation by Government agents after careful consideration of the questions which the present law fails to meet. The material changes in the present law embodied in the inclosed draft are, briefly:

First. The erection of traps only under regulations prescribed by the Secretary of the Treasury.

Second. The withdrawal of the protection afforded by the present law to salmon trout, it being generally understood that the latter species are destructive to salmon spawn and fry.

Third. The extension of the operations of the law to the territorial waters of Alaska, thereby preventing the erection of stationary obstructions in the approaches to rivers and streams.

Fourth. The prohibition of the erection of salmon canneries in Alaska without a permit from the Secretary of the Treasury.

Fifth. The requirement of a detailed annual statement of the operations of all canneries and manufactories of fish-oil production to the special agents for the salmon fisheries.

Sixth. The detailing of an employee of the Treasury Department to act as an additional special agent without extra compensation.

Seventh. The imposition of a tax upon the output of all canneries, salteries, fish-oil or fish-fertilizer works.

Eighth. Changing the penalty for violation of this act from a maximum fine of $1,000 to $5,000.

The first section of the present law, wherein it is stated "or to fish for or catch salmon or salmon trout in any manner or by any means, with the purpose or result of preventing or impeding the ascent of salmon to their spawning-ground, is declared to be unlawful," places the whole matter in the hands of the Secretary of the Treasury. The second section, relating to the weekly close season, should in my opinion make no exception *in any district*. The plea is probably made that in the districts exempted the fish are taken in gill nets, which permit some fish to pass all the time; but if this is the plea it is a mistake. Every cannery in Bering Sea and Cook Inlet uses traps besides gill nets, and is there any reason why traps should be used at those places during the weekly close season and not at Chignik? In Prince William Sound neither traps nor gill nets are used; all fish are taken in seines—yet it is exempt from operation of the close-time provision of the law. The fisheries in this locality are on the same footing as those in southeast Alaska, except that gill nets are used in Chilkat and Taku inlets and at the mouth of the Stikine. If the exception is made on the gill-net plea, then the law should provide that "all canneries obtaining their fish by gill nets *exclusively* are exempt." If the exception is made on account of a short fishing season, it might hold good for Bering Sea, but in no other place, though I should be opposed to any exemption. The run of redfish in Cook Inlet and Prince William Sound is for a long period, and in fact for a longer period than in the southeast Alaska district, and on these pleas there is absolutely no reason for exempting those places.

The time of the weekly close season should by all means be changed so as to include Sunday. As it stands, it was no doubt intended that the canneries should pack the Friday's catch on Saturday and be closed on Sunday. If the law were observed it would permit the Chinese, who know no Sabbath, to rest on that day, while the white fishermen and Indians would be obliged to work on that day. We send missionaries among the Indians and teach them to keep the Sabbath, and then enact laws which compel them to work. Mr. Duncan, at Metlakahtla, states that his Indians do not fish during the close season on account of the law, and would not on the Sabbath on account of his teachings, and the law therefore bears hard upon that community.

The first part of section 2 might as well read so as to make it unlawful to take salmon in any river or stream above tidewater, with the exceptions given in the act, for the reason that there are no fisheries in Alaska, so far as I know, above tidewater in any river or stream over 500 feet in width. This section would, however, be very much improved if "tidewater" were stricken out and the section made to read "in any of the rivers, streams, or estuaries less than 500 feet wide," and then the last provision

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[*] The bill making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1897, contained the following provision:

"For the protection of the salmon fisheries of Alaska, under the direction of the Secretary of the Treasury, seven thousand dollars, to be immediately available: *Provided*, That in lieu of the three inspectors whose employment is authorized by the act of June ninth, eighteen hundred and ninety-six, there shall be appointed by the President, by and with the advice and consent of the Senate, one agent at a salary of two thousand five hundred dollars per annum, and one assistant agent at a salary of two thousand dollars per annum." (Statutes 55th Cong., 1st sess., chap. 2, 1897, p. 29.)

The sundry civil bill for the fiscal year ending June 30, 1898, appropriated the same amount for the protection of the salmon fisheries, without specifying the salaries to be paid.

TOTEMS AT KASAAN VILLAGE.

CASCADE IN STREAM, KETCHIKAN.

of the section could be cut out entirely. The words "rivers, streams, and channels" should be used with considerable caution as to the meaning. There should also be a proviso making it unlawful to pack fish taken illegally.

The Treasury Department is empowered to establish regulations governing the salmon fisheries, and the first section gives ample power in the matter. There are several technical points which need explanation and should be embodied in the regulations. The most important of these refers to section 2, and is as follows: Does the law, so far as it relates to rivers or streams that receive tidal waters, refer to the conditions at low water or at high water? As a rule there are great flats off the mouths of the Alaska rivers, and, as there is a rise and fall of tide of from 15 to 40 feet, varying in the different sections, the topographical features appear very different at low water from what they do at high water. Low water is the proper base to which the laws should apply, and is the plane to which Government surveys are reduced on all charts. Everything pertaining to hydrography is reduced to low water, and on published surveys the dividing line between land and water is the line cut by the low-water plane. This is a question of vital importance and a decision should be rendered.

The same question involves the legality of traps in the Kussilof River and others to the westward. The point is whether or not they are in the river. The Kussilof River at high water has its mouth at the point where it debouches into Cook Inlet, where the banks are both defined within the meaning of shore people; while at low water the stream flows between steep and well-defined banks that are covered at high water, yet they are banks, and the mouth is then a long distance from the high-water mouth.

One of the traps at Kussilof is between what might be called the high-water mouth and the low-water mouth of the river. It is the one near the cannery on the southern bank. The leader commences at high-water mark and extends down the left bank with the heart in the low-water river, which is quite narrow. At high water the trap is clearly outside of the river, at low water it is as clearly inside, but it is then mostly uncovered and on dry land, and serves no more purpose in catching fish than a line of telegraph poles. This low-water river is very shallow; in fact, it has a bar at the mouth which dries at the lowest tides, so that fish do not ascend at low water, but probably only at high water, when they trim closely around the shore and are deflected into the trap. It is said that the traps at Kenai are similarly located, and are in fact in the river. We did not visit Kenai, as no cannery has been in operation there for a number of years, and as the fishing season was all over and the traps pulled up at the time of our call.

A decision on the following point is also very necessary: There are several bodies of water in Alaska which are joined to the sea by narrow passages which at low tide are rapids, thus making lakes or lagoons of these interior bodies, and during the last of the flood tide the water flows in, forming them into tidal basins. Naha and Karluk are examples of this, but others may be found. If the plane of low water is decided upon as the meaning of the law, some of these bodies probably become lakes; but is it illegal to take a salmon in a lake? The law prohibits fishing by any means that prevents the parent salmon from reaching the spawning-ground; but, so far as I can learn, nothing is said about fishing on the spawning-ground in the lakes, which is vastly more important than fishing in the streams. My opinion is that, in *ascending* a river from the sea, when that "river, stream, or estuary" once attains a width in which it is illegal to fish, even though it afterwards widens into a lake or basin, it should be regarded, so far as the law is concerned, as of the width restricted by the law, for the lake or basin can flow no more water than the narrow part of the outlet unless there are more outlets, which is exceedingly improbable.

Traps should either not be allowed or else should be regulated. The leads, heart, and wings should not be permitted to extend over more than one-third of the width of the channel (not width between banks), and the shore end of the leader should not be permitted to approach nearer the shore than 100 feet from the low-water mark, and no trap should be permitted within 300 yards of any other trap.

Under section 1, of the law quoted, the Treasury Department should by all means regulate the fishing in approaches to the stream. It is recommended that off the mouths of all streams in which fishing is prohibited by the act, no fishing be permitted, except by rod or spear, over an area formed by drawing a line from a point 100 yards on either side of the river, in a direction parallel to the flow at the mouth and extending 500 yards into the bay, arm, or sea. In several localities the seines are run across the mouths of the rivers, and one seine follows another in such rapid succession that but few fish can ascend, for it must be remembered that a seine dragged through the water must necessarily frighten the fish, and those that are not taken probably do not return for an appreciable time, and then only to encounter another seine.

The law does not provide for a sufficient number of inspectors. Six would not be too many, and it should be stated that the appointees shall be practical fishermen, who must be in the field from the time fishing begins—in some districts early in May—until it closes, in some districts about the 1st of October.

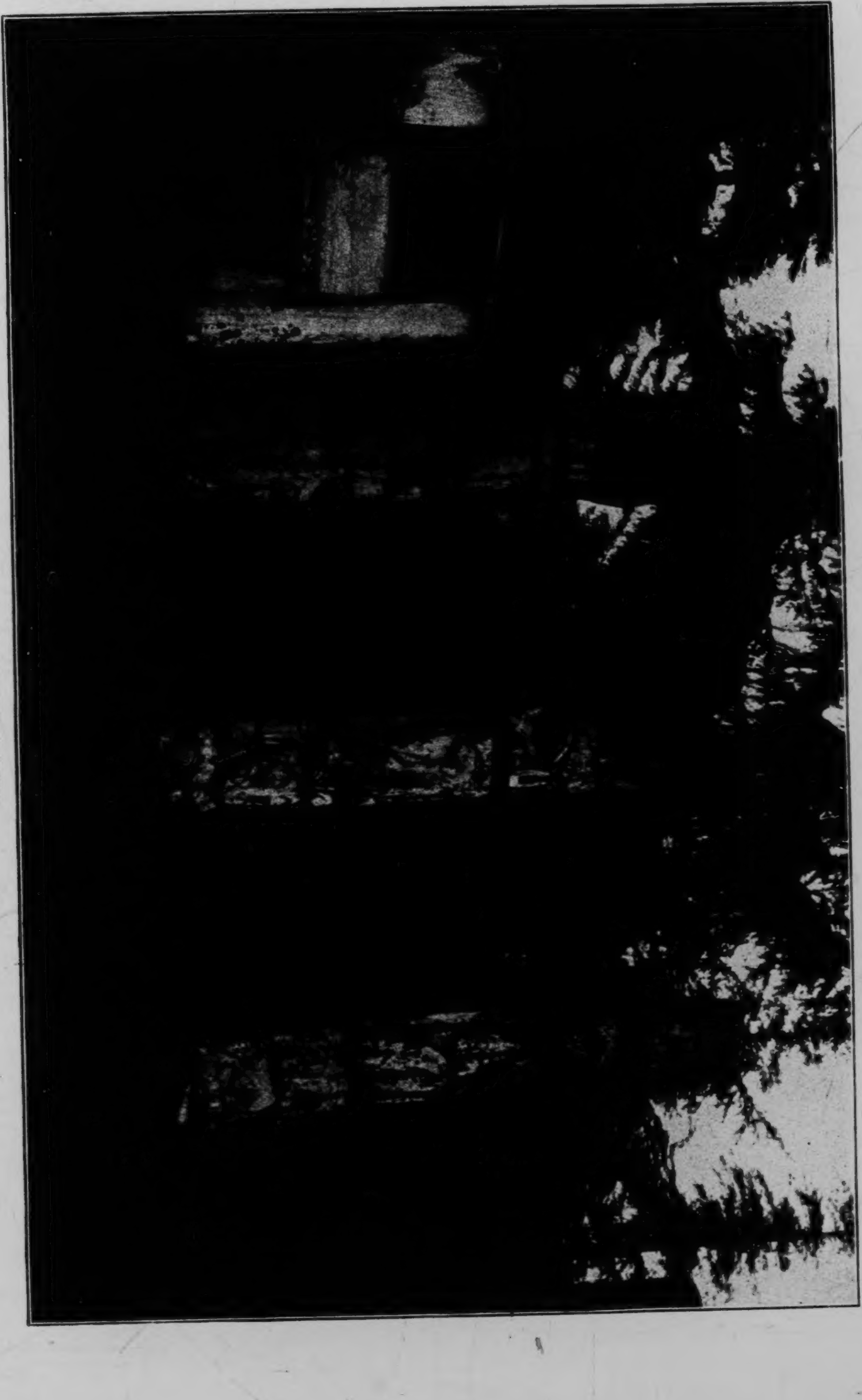
The inspectors should be clothed with the power to reject fish that are unfit. Fish out of the water for more than forty-eight hours should be rejected. It may be considered by some that this is too short a time; that the weather of Alaska will permit fish to remain in good condition for a longer period. But this is not the case; during the packing season there are at times warm days, and there is much rain and fog, the fish are handled in masses, and deterioration is rapid.

The superintendents of the canneries of the largest organization that operates in Alaska are instructed not to pack fish that have been more than forty-eight hours out of the water. There are probably fewer bad fish packed than is usually believed by the public, yet many are packed that are unfit.

Reference has already been made to the manner in which fish are collected at some canneries from distant points. These fish are often two days old when collected, and before they are finally packed three or four days have elapsed, and they are then probably unfit for food.

In order that the productive capacity of the streams may be known, the law should provide that each cannery, saltery, or person engaged in packing, canning, salting, or drying, or otherwise preparing salmon for commercial purposes, must, on or before December 31 of each year, submit to the Treasury Department a sworn statement giving the number of cases, boxes, barrels, bales, or bundles of *each* species so prepared, and the number of fish of each and every species used in the business, separately for each stream, together with the dates when fishing was commenced and ended in each stream. Without this information it is simply impossible to ascertain the correct value of the streams and to regulate the fisheries.

The law should also provide that all cans should be distinctly marked with the name and location of the cannery and the kind of salmon packed.



INDIAN GRAVE AND TOTEMS, KLINKWAN.

RELATIONS BETWEEN THE SALMON FISHERIES AND THE INDIANS.

Whenever the *Albatross* anchored near any locality either permanently or temporarily inhabited by natives, a delegation of the older men or chiefs came on board and requested an audience. The powwows which followed invariably took the form of relating the oppression of the white man. At Klinkwan, Chacon, Klakas, Klawak, Metlakahtla, Kasaan, Karta Bay, and, in fact, everywhere, the Indians were greatly exercised over their condition, and notwithstanding that they were repeatedly informed that the Fish Commission party had nothing to do with the execution of the law and was merely in the country for the purpose of examining the fisheries, they insisted that, as we were Government officers, we must hear them.

The permanent Indian villages during the spring and summer months are practically deserted except by a few old people, the young men and women being away, living in camps and curing their winter supply during the spring, and when the canneries open, fishing for them or doing work about them. The canneries at Klawak and Metlakahtla are operated by Indians, the former drawing quite a number from Howkan and Klinkwan. At Chacon the Indians from Kasaan were curing halibut, and they were again met at Hunter Bay, where they had come for cannery work. It is only during the winter that the permanent villages are fully inhabited.

They are essentially fish-eating Indians, depending upon the streams of the country for a large amount of food supply. These streams, under their own administration, for centuries have belonged to certain families or clans settled in the vicinity, and their rights in these streams have never been infringed upon until the advent of the whites. No Indians would fish in a stream not their own except by invitation, and they can not understand how those of a higher civilization should be—as they regard it—less honorable than their own savage kind. They claim the white man is crowding them from their homes, robbing them of their ancestral rights, taking away their fish by shiploads; that their streams must soon become exhausted; that the Indian will have no supply to maintain himself and family, and that starvation must follow.

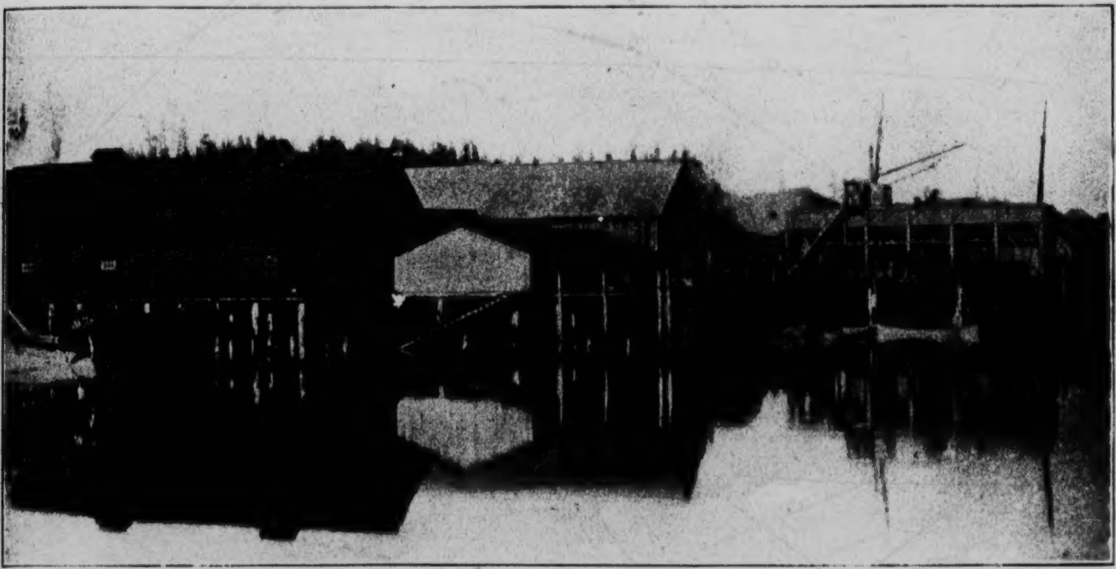
The natives urge that the law prohibiting them from owning mining claims is very hard to endure; that they wear the same clothes, eat the same food, obey the same laws as the white man, and are far more orderly than the white communities, and that they should have the same rights. They acknowledge the white man's superiority; all they want is suitable encouragement to imitate him. The Prince of Wales Indians also complained against the Metlakahtla community, stating that the latter are foreigners and come to their island, cut out the best timber, and carry it to their sawmill at Metlakahtla. While acknowledging the Metlakahtlans as superior in intelligence, they say that they would gladly embrace the same opportunities.

From the Indians' standpoint, their complaints are undoubtedly well founded, but history will no doubt repeat itself here, as in other portions of our country, where the aborigines have come in contact with the civilizing influence of the white man, where rum, disease, and mercenary dealings have slowly but surely exterminated them. My own sympathy is with the Indian, and I would gladly recommend, if the way were clear, the establishment of ownership in streams; but it is impracticable, and I can only ask for him a consideration of his claim and, whatever law is framed, that a liberal balance be thrown in his favor.

In operating the canneries, the Indian sees the value of the fish; he sees a means for obtaining money, the purchasing power of which he knows as well as does the white man, and if he could possess all the fish which he believes are his by right of inheritance, he would have plenty of money. In some instances canneries recognize well-established Indian rights to salmon streams by paying the chiefs a certain amount per year for the privilege of fishing, but in many cases unscrupulous white men have gone among them with promises, only to break them when payment was due.

It can not be denied, however, that the Indian is better situated now than he was before the canneries were established, or than he would be if the canneries were moved out of the country or abandoned. So far as his fish supply is concerned, it has not been seriously curtailed for his own use and can not be in the future, for long before salmon become extinct the canneries will be abandoned as unprofitable. It probably takes a little more work to get his winter supply now, but the money which the canneries bring him permits a purchase of various foods, and so a large supply of fish is not as necessary as formerly. The canneries bring the Indian ready money, far more than he can earn by labor in any other way, and if he is at all industrious he can earn sufficient during a canning season to support himself and his family during the winter. The canneries will most willingly pay for all the fish he brings them, or they will give him work at the cannery if he can be depended upon. Here, of course, is the chief difficulty. The cannery season is short, and men must be employed who are willing to give their labor at all times, and the Indian tires of his work very quickly. In the midst of it he is often seized with a desire to leave; he must hunt, or he must get fish for his family, although his wages for a day will purchase more fish than he can catch in a week; still he must go, and he goes. As a result, canneries do not want his labor.

Catch of halibut on deck of steamer *Albatross*, near Killisnoo.



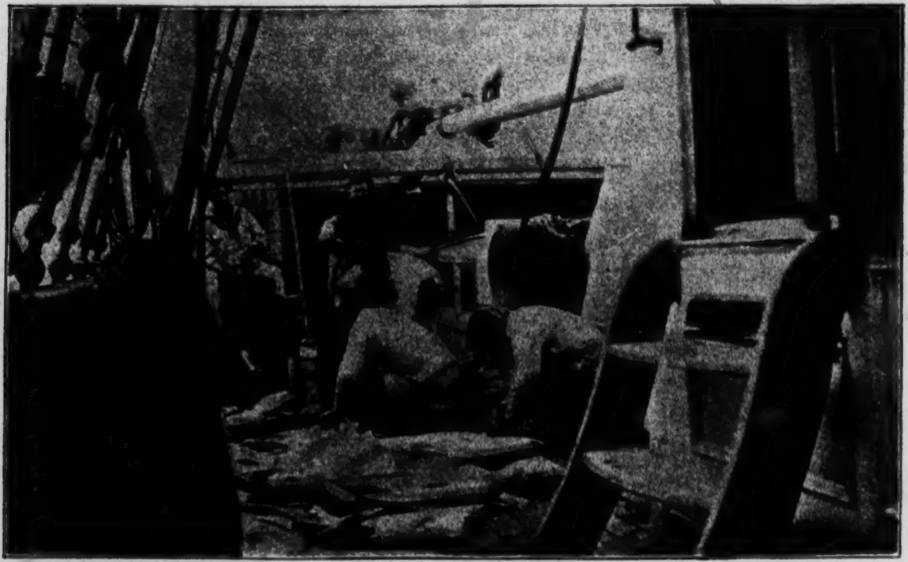
OIL AND GUANO FACTORY AT KILLISNOO

GILL NET SET BY NATIVES, LAKE EYAK

FISHING AND COLLECTING BY THE ALBATROSS.

During the cruise, fishing by the ship's force with gill nets, seines, trawls, hand lines, etc., was carried on whenever an opportunity offered. As the instructions also called for information relating to halibut, fishing efforts were largely in that direction.

With gill nets we were only successful at Wrangell (mouth of the Stikine River), Uganuk, Yakutat, and Redfish Bay, localities where the water was not clear. We took the first Dolly Varden trout (*Salvelinus malma*), on June 10 at Metlakahtla, and the first redfish at Karta Bay June 26. At Thorne Bay, on July 5, we took 78 redfish with an average weight of 6 pounds, and 83 Dolly Varden trout averaging 1½ pounds in weight. At Wrangell, in the discolored water, on July 7 we took a number of king and dog salmon and redfish in the same gill net.



Cleaning halibut on deck of steamer *Albatross*, near Killisnoo.

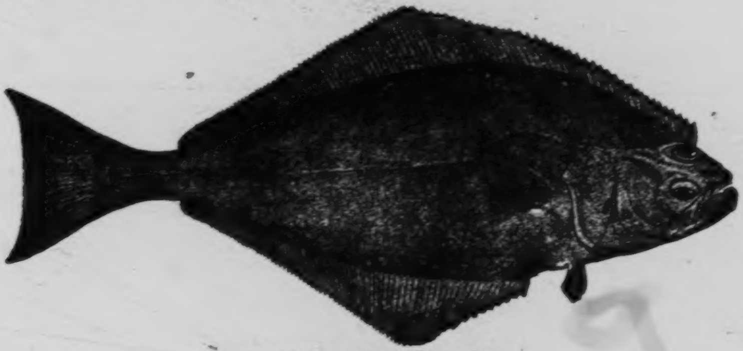
HALIBUT.

The halibut trawls were set in all localities and every effort made not only to find halibut banks by our own resources, but inquiry was made at every point relating to this subject. The investigations confirm the views of those whom I believe competent to judge, and that is that in southeast Alaska, on the American side of Dixon Entrance, there are no halibut banks for commercial purposes. Halibut were usually taken wherever we went, but nowhere in large numbers except off Killisnoo.

On the southern side of Dixon Entrance, on the plateau of the Queen Charlotte Islands, in the vicinity of Rose Spit and in Hecate Straits, there is comparatively shoal water—that is, under 50 fathoms; in these localities halibut are obtained in considerable numbers throughout the winter months when they are desired in Puget Sound for eastern shipment. In the spring and summer halibut are found scattering or in clusters throughout all the waters of southeast Alaska, but nowhere do great banks exist, so far as known, on which a vessel might fill up at all times, as can be done on the British Columbia side. They seem to follow the herring, and can also be obtained off any of the canneries, where they probably feed on the offal, and are sufficiently plentiful for local demands.

On Bear Island, at the entrance to Nichols Bay, west of Cape Chacon, southern shore of Prince of Wales Island, is a summer village where the Indians from the surrounding country camp and obtain their supply of halibut for drying. At the time of the visit of the *Albatross* it was occupied by Chief Skowl and part of his tribe of Kasaans. From this chief, who is rather an intelligent Indian, and his headmen, it was learned that off Cape Chacon are a number of spots which the Indians locate by shore ranges and obtain there sufficient halibut for their own use and dry some for trade with the Tsimpseans, from whom they obtain eulachon oil. The Indians will speak with uplifted arms of "hyas pish" (plenty of fish), but their ideas do not go beyond satisfying their own wants. There are no banks here. The halibut are found in spots, and while a vessel might fill up, the fish would soon be cleaned off.

Mr. Clark, proprietor of a saltery at Ketchikan, and a former Cape Ann fisherman, has a schooner and has tried to make a business of marketing halibut in the winter. He has prospected the ground himself, and has extended his inquiry in all directions, and his experience is similar to what has been stated.



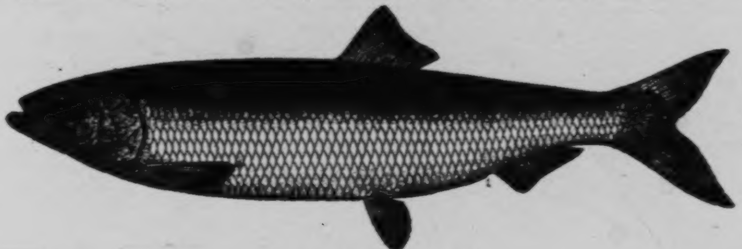
HALIBUT (*Hippoglossus hippoglossus*).

Mr. Miller, of Klinkwan, stated that he had prospected over southeast Alaska, and had nowhere found any banks; that scattering halibut could be found everywhere and in numbers in spots during the summer, and some few in winter, but nowhere in quantities to supply a considerable market.

Clarence Strait is frequently referred to as a great halibut-ground, and tourists who make the southeast Alaska trip are loud in their descriptions of the halibut fisheries off Killisnoo. The steamer *Queen*, which carries Alaska excursionists, makes it a point to give them a few hours of halibut fishing, and sometimes when a good spot is found, or there is a large run of herring, many halibut are taken, while at other times they are not so abundant. When the average tourist gets a 50-pound halibut on his line, he has the experience of his life, and much has been said and written of these halibut-grounds. The *Queen* usually fishes between Danger Point and Kenasnow Rocks, off the winter village of Angoon, or in that vicinity. Danger Point is 3 miles from the northern entrance to Killisnoo, and forms the southern point of entrance to

Kootznahoo Inlet. This inlet is noted for its immense schools of herring, and the Alaska Oil and Guano Company, located at Killisnoo, draws a large part of its fish from this inlet.

The ground where it is said the *Queen* usually fishes was fished by the *Albatross* for an hour in from 40 to 50 fathoms of water; one halibut weighing 45 pounds was taken. We then moved off Danger Point, about one-fourth of a mile off the buoy marking the end of the reef, and fished from the vessel and two small boats with 21 hand-lines all told, in from 10 to 30 fathoms, and 'n 1½ hours obtained 143 halibut, average weight 22 pounds—the smallest 5 pounds, the largest 61 pounds. After this the vessel was moved 1 mile to the northward and continued fishing with hand lines, but nothing was taken. At Danger Point there was a large school of herring running into the inlet at the time of our fishing. The fishing is carried on over the shore shelf and the halibut are attracted by the herring. Small halibut vessels sometimes visit this locality and make part of a load, but there is no certainty at any time.



HERRING (*Clupea pallasi*).

About 4 miles above Danger Point are several halibut spots, and at the entrance to Che-Ik Bay is fairly good ground, but there are no banks that would supply a considerable market. A halibut was taken under the wharf at Killisnoo during the summer of 1897 weighing 450 pounds. It was in shoal water eating salmon heads and would not take the bait, so the hook was placed on the end of a pole and pushed into its mouth. The largest halibut we took weighed 165 pounds. It was caught on a trawl at Chasina Anchorage, Prince of Wales Island. As a rule the halibut are small. The weights of those we took at Killisnoo will give a fair average.

The Indians at Yakutat in the spring of the year, when their stock of dried salmon is running low, fish on spots off Cape Phipps and take all they want for their own use. During a day trawls were set with an experience similar to that in southeast Alaska. A few halibut were caught each time, but here, as in other localities, the lines were filled with dogfish. It is possible that an extended examination might give different results, but for winter fishing it is a long distance from market, with severe weather to be encountered.

We made several trial sets in Sitka Sound and took a few scattering halibut and a great many dogfish.

Several years ago Mr. Robert Bell, who lives at Thorne Bay, spent the months of December, January, February, and part of March in a schooner prospecting for halibut in southeast Alaska. He fished all over the interior waters from Dixon Entrance to Peril Straits, and outside from Salisbury Sound to Dixon Entrance. As he has been a permanent resident of the Territory for some years and is in the fish business, he is well acquainted with the subject so far as it is known. On this occasion, at several points, from 5,000 to 6,000 pounds of halibut were obtained, but before the load could be made the fish spoiled and had to be thrown overboard. As a last resort, the vessel made for the Queen Charlotte banks, filled up, and went to market.

Our investigation of the halibut fisheries of Alaska was incidental to that of salmon; it would probably occupy several seasons for the thorough examination of this subject alone.

CHARTS OF THE ALASKA SALMON DISTRICTS.

The accompanying charts A and B are designed to show, as completely as possible, the location of the salmon canneries and streams of Alaska, the productive capacity of the streams, and such other information bearing upon the fishing interests of the region as could be appropriately given in this manner.

Several corrections are to be noted, most of them occurring in the lists of canneries printed on the charts.

The following canneries are owned by the Alaska Packers' Association, and should be so noted:

Southeast Alaska.

- Operated, 1897:
  - Pyramid Harbor Packing Co.
  - Glacier Packing Co.
  - Alaska Salmon Packing and Fur Co.
- Reserve, 1897:
  - Chilkat Canning Co.

Western Alaska.

- Operated, 1897:
  - Bristol Bay Canning Co.
  - Arctic Packing Co. at Nushagak.
  - Alaska Packing Co.
  - Point Roberts Packing Co.
  - Arctic Packing Co. at Naknek.
  - Ugashik Fishing Station.
- Reserve, 1897:
  - Nushagak Packing Co.
  - Bering Sea Packing Co.

Central Alaska.

- Operated, 1897:
  - Pacific Packing Co.
  - Arctic Fishing Co.
  - Karluk Packing Co.
  - Hume-Aleutian Packing Co.
  - Alaska Improvement Co.
  - Uganuk Fishing Station.
  - Arctic Packing Co. at Alitak.
  - Chignik Bay Co.
- Reserve, 1897:
  - Northern Packing Co.
  - Hume Canning and Trading Co.
  - Kodiak Packing Co. at Karluk.
  - Kodiak Packing Co. at Alitak.
  - Chignik Bay Packing Co.

Chart A.—"Kasan Bay" should be "Kasaan Bay."

Abandoned saltery No. 5 should be designated "Morrisey" instead of "No name."

Chart B.—In the list of canneries Cannery No. 4 should be designated "Uganuk Fishing Station."

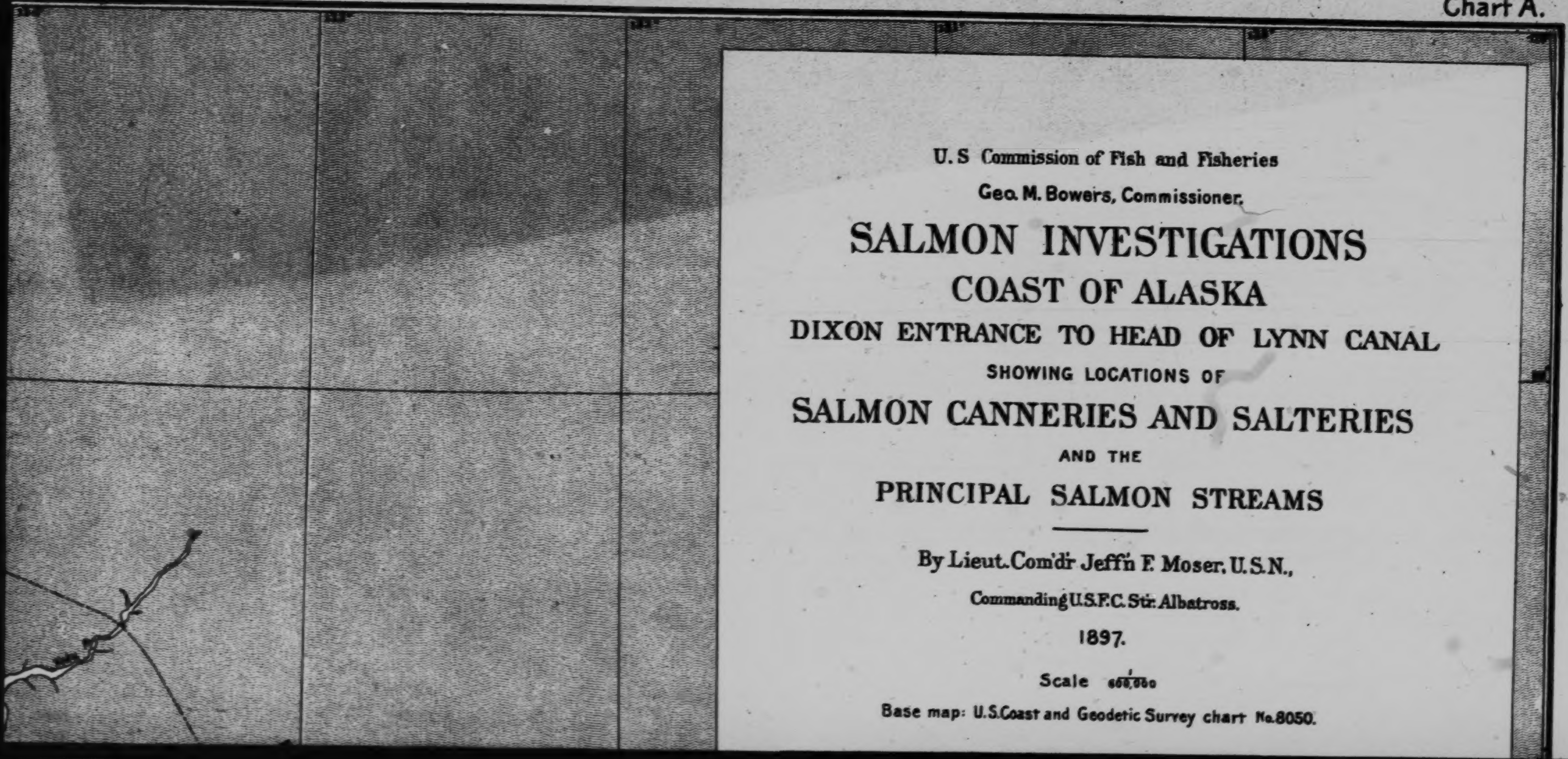
Reserve cannery No. 9 should be designated "Chignik Bay Packing Co."

Reserve saltery No. 2 should be designated "Uganuk Fishing Station."

"Alaska Coast and Fishing Co." should be "Alaska Coast Fishing Co."

The name of the company operating reserve canneries 4 and 6 is the "Kodiak Packing Co.," the old spelling of the name of the island being retained, instead of the present accepted spelling "Kadiak."

Chart A.



U. S Commission of Fish and Fisheries
Geo. M. Bowers, Commissioner.

SALMON INVESTIGATIONS
COAST OF ALASKA
DIXON ENTRANCE TO HEAD OF LYNN CANAL

SHOWING LOCATIONS OF

SALMON CANNERIES AND SALTERIES

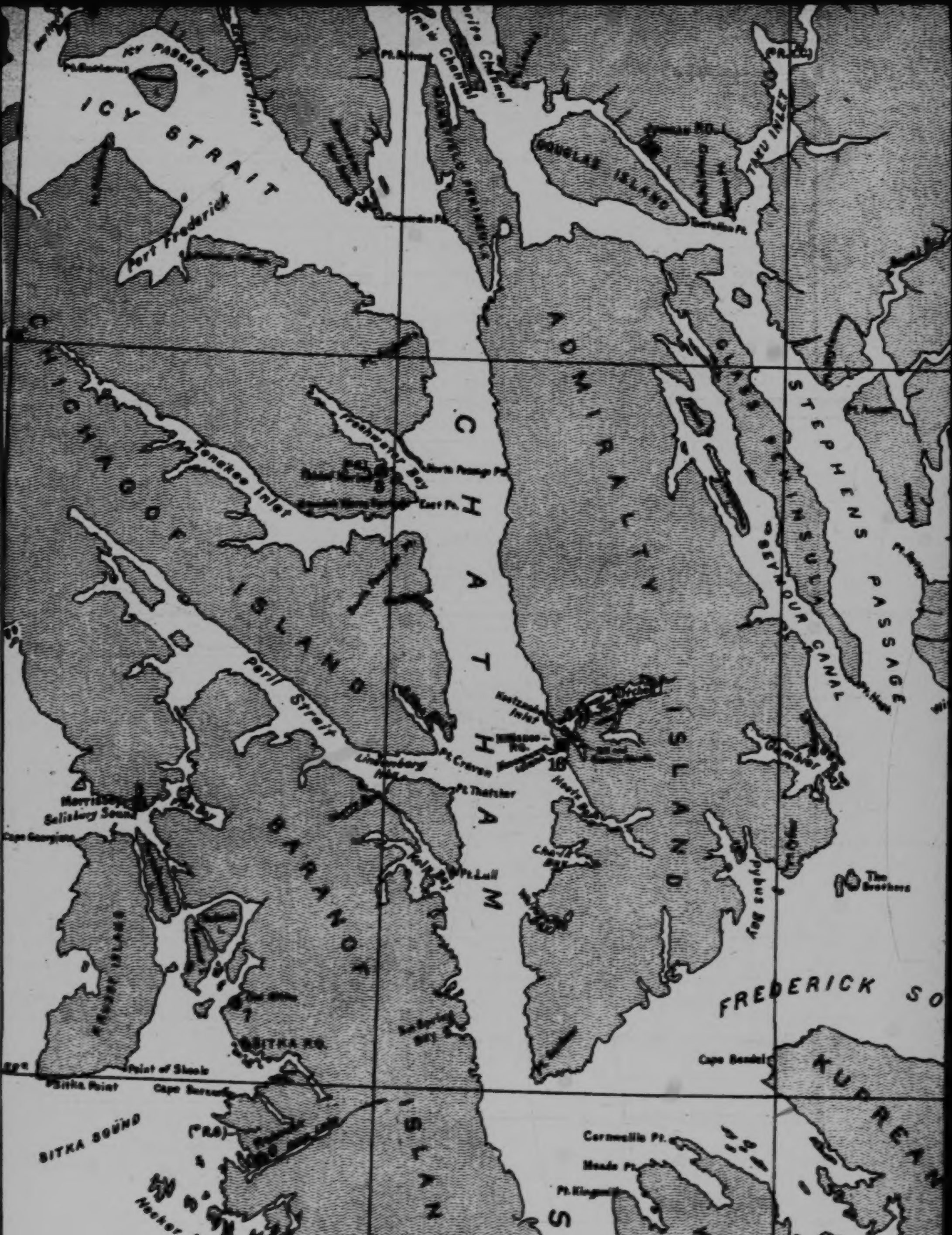
AND THE

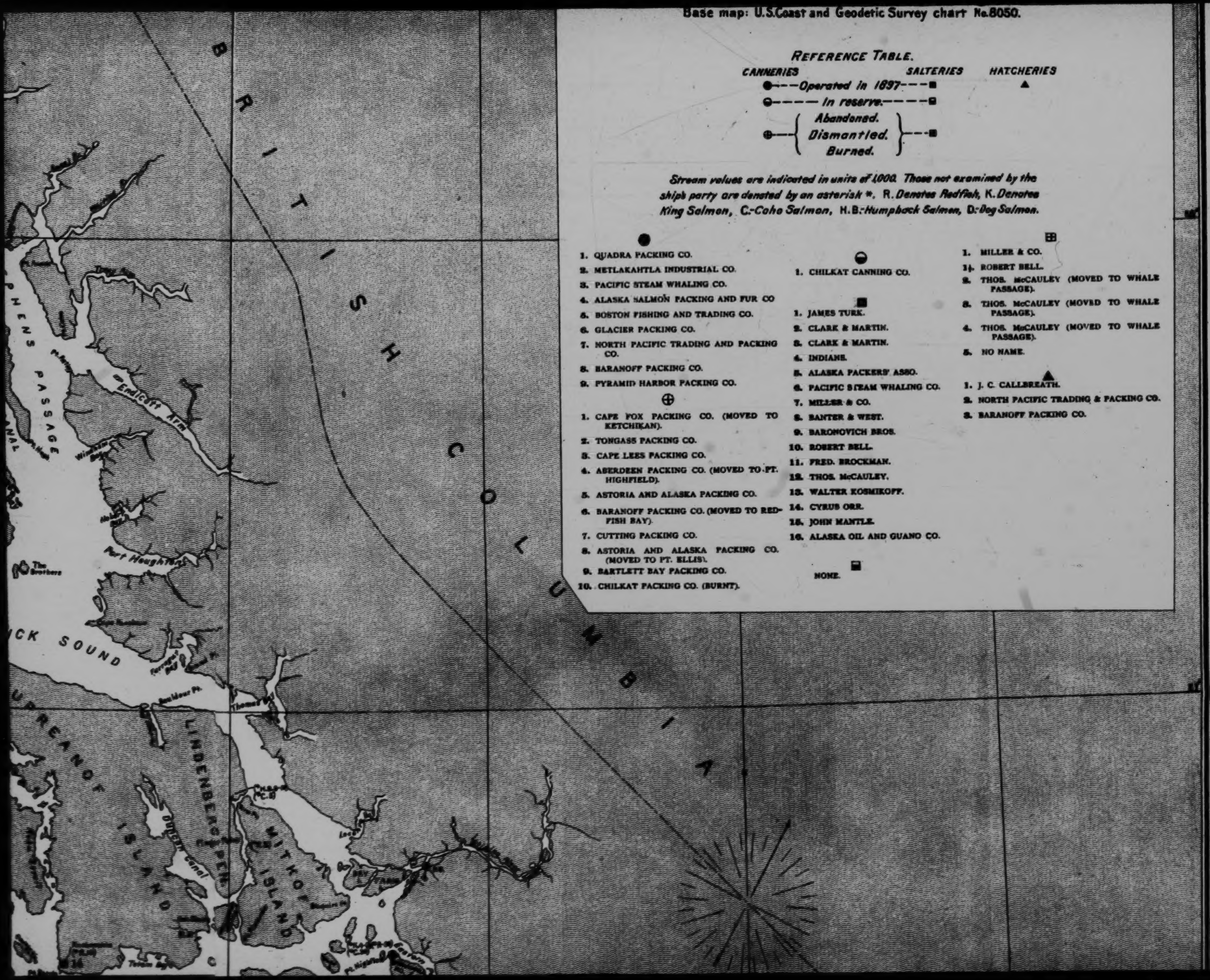
PRINCIPAL SALMON STREAMS

By Lieut. Com'dr Jeff'n F. Moser. U.S.N.,
Commanding U.S.F.C. Str. Albatross.
1897.

Scale $\frac{1}{600,000}$

Base map: U.S. Coast and Geodetic Survey chart No. 8050.


ICY PASSAGE
Pt. Gustavus
ICY STRAIT
Port Frederick
Inlet
Channel
DOUGLAS ISLAND
TAKU INLET
(PR.CC)
CHICHAGOF ISLAND
Tenakee Inlet
Freshwater Bay
North Passage Pt.
East Pt.
CHATHAM
ADMIRALTY ISLAND
GLASS PENINSULA
STEPHENS PASSAGE
SEYMOUR CANAL
Peril Strait
Lindenberg Hd.
Pt. Craven
Pt. Thatcher
Kootznahoo Inlet
Killisnoo
16
Hoods Bay
Chaik Bay
Gambier Bay
Pybus Bay
The Brothers
Pt. Hugh
Pt. Lull
Morris Bay
Salisbury Sound
Cape Georgiana
KRUZOF ISLAND
BARANOF
Point of Shoals
Sitka Point
SITKA RD.
Cape Baranof
SITKA SOUND
(PR.G)
Hacker Islands
ISLAND
FREDERICK SO
Cape Bendel
KUPREANOF
Cornwallis Pt.
Meade Pt.
Pt. Kingsmill
KUIU
STRAIT


BRITISH COLUMBIA
STEPHENS PASSAGE
Endicott Arm
Port Houghton
The Brothers
FREDERICK SOUND
Boulder Pt.
KUPREANOF ISLAND
LINDENBERG PEN.
MITKOF ISLAND
Duncan Canal

Base map: U.S.Coast and Geodetic Survey chart No.8050.

REFERENCE TABLE.

CANNERIES — SALTERIES — HATCHERIES

● ---Operated in 1897--- ■ ▲

⊖ ---- In reserve.---- ⬓

⊕ —{ Abandoned. Dismantled. Burned. }--- ■

*Stream values are indicated in units of 1,000. Those not examined by the ship's party are denoted by an asterisk *. R. Denotes Redfish, K. Denotes King Salmon, C.-Coho Salmon, H.B.-Humpback Salmon, D.-Dog Salmon.*

●

1. QUADRA PACKING CO.
2. METLAKAHTLA INDUSTRIAL CO.
3. PACIFIC STEAM WHALING CO.
4. ALASKA SALMON PACKING AND FUR CO
5. BOSTON FISHING AND TRADING CO.
6. GLACIER PACKING CO.
7. NORTH PACIFIC TRADING AND PACKING CO.
8. BARANOFF PACKING CO.
9. PYRAMID HARBOR PACKING CO.

⊕

1. CAPE FOX PACKING CO. (MOVED TO KETCHIKAN).
2. TONGASS PACKING CO.
3. CAPE LEES PACKING CO.
4. ABERDEEN PACKING CO. (MOVED TO PT. HIGHFIELD).
5. ASTORIA AND ALASKA PACKING CO.
6. BARANOFF PACKING CO. (MOVED TO RED-FISH BAY).
7. CUTTING PACKING CO.
8. ASTORIA AND ALASKA PACKING CO. (MOVED TO PT. ELLIS).
9. BARTLETT BAY PACKING CO.
10. CHILKAT PACKING CO. (BURNT).

⊖

1. CHILKAT CANNING CO.

■

1. JAMES TURK.
2. CLARK & MARTIN.
3. CLARK & MARTIN.
4. INDIANS.
5. ALASKA PACKERS' ASSO.
6. PACIFIC STEAM WHALING CO.
7. MILLER & CO.
8. BANTER & WEST.
9. BARONOVICH BROS.
10. ROBERT BELL.
11. FRED. BROCKMAN.
12. THOS. McCAULEY.
13. WALTER KOSMIKOFF.
14. CYRUS ORR.
15. JOHN MANTLE.
16. ALASKA OIL AND GUANO CO.

⬓

NONE.

⊞

1. MILLER & CO.

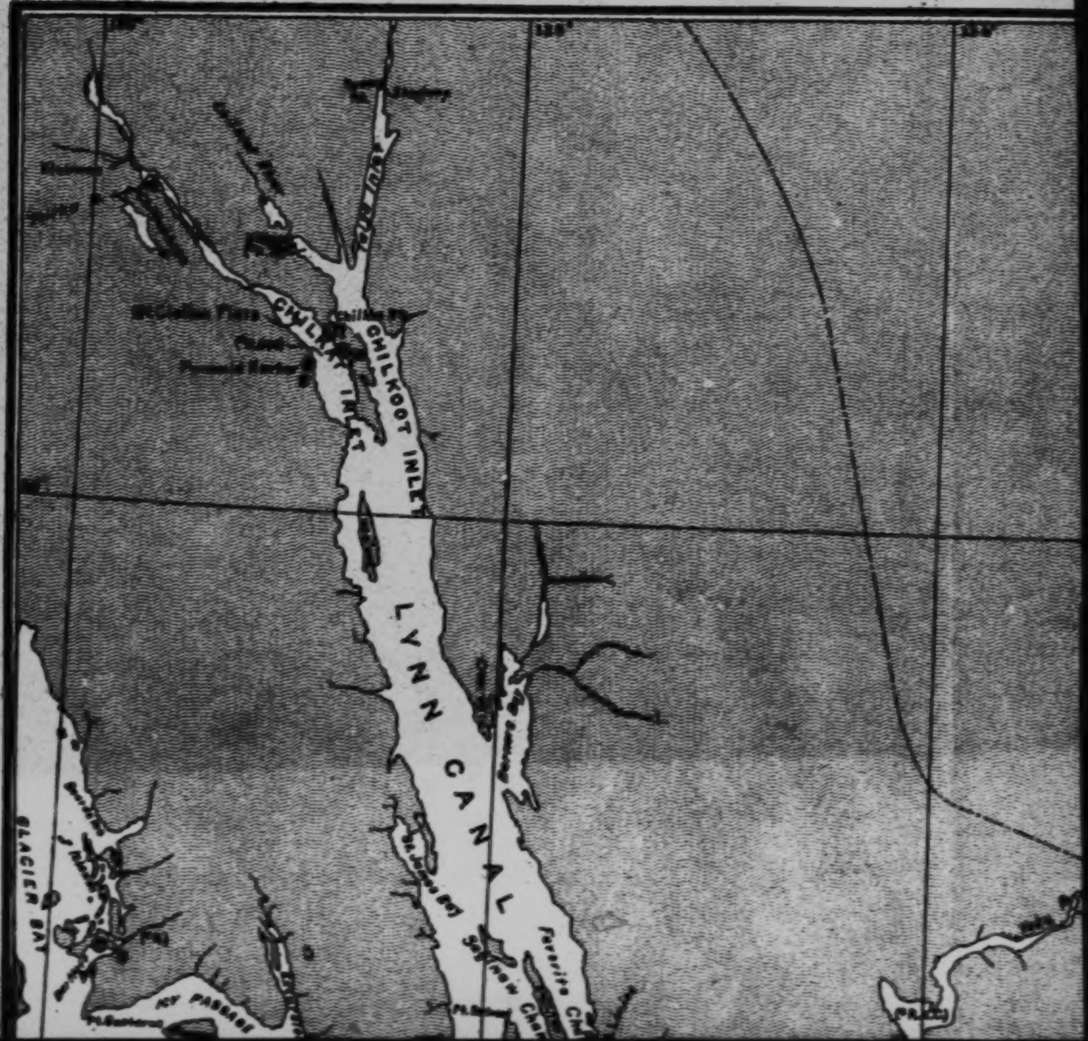
1½. ROBERT BELL.

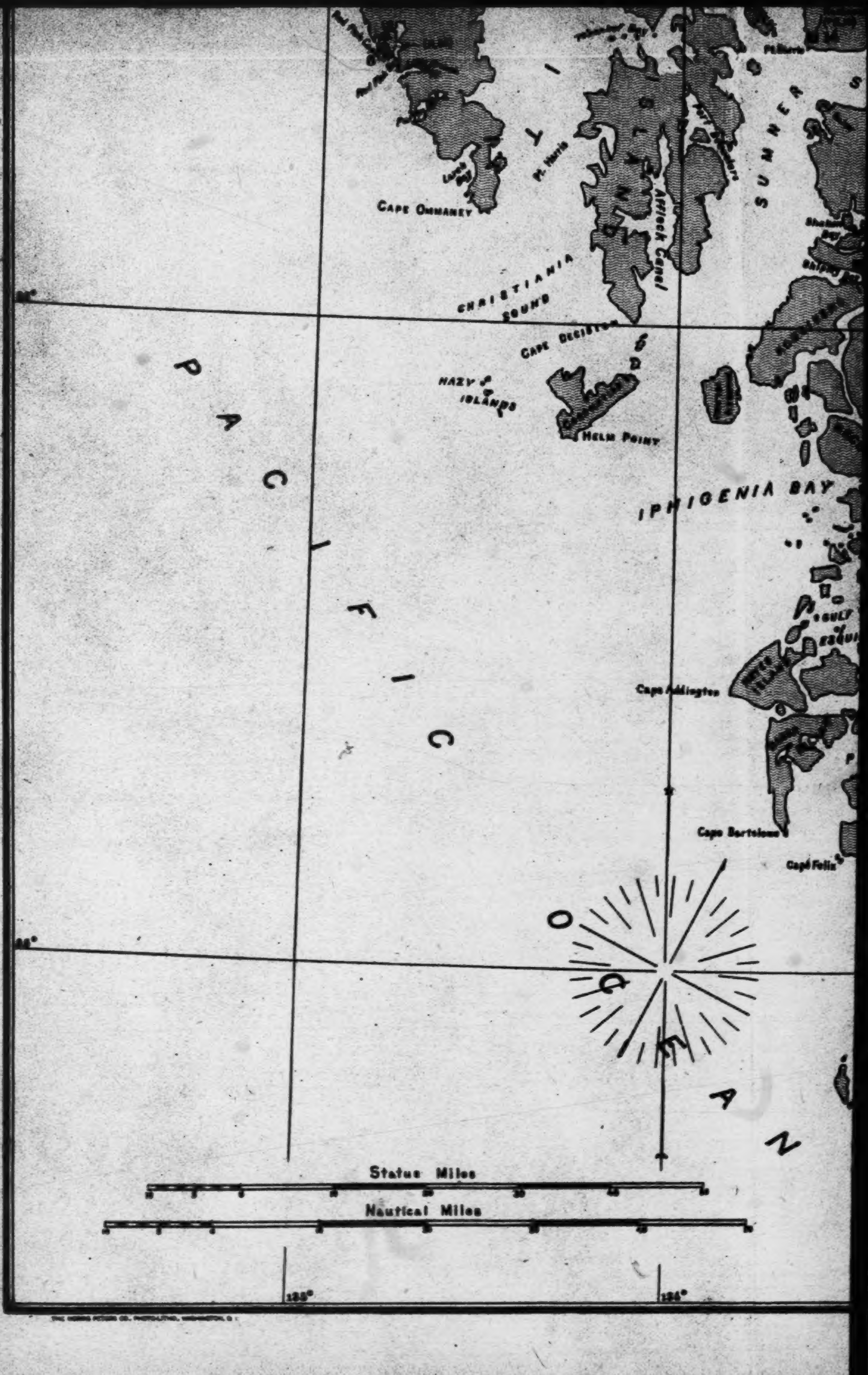
2. THOS. McCAULEY (MOVED TO WHALE PASSAGE).
3. THOS. McCAULEY (MOVED TO WHALE PASSAGE).
4. THOS. McCAULEY (MOVED TO WHALE PASSAGE).
5. NO NAME.

▲

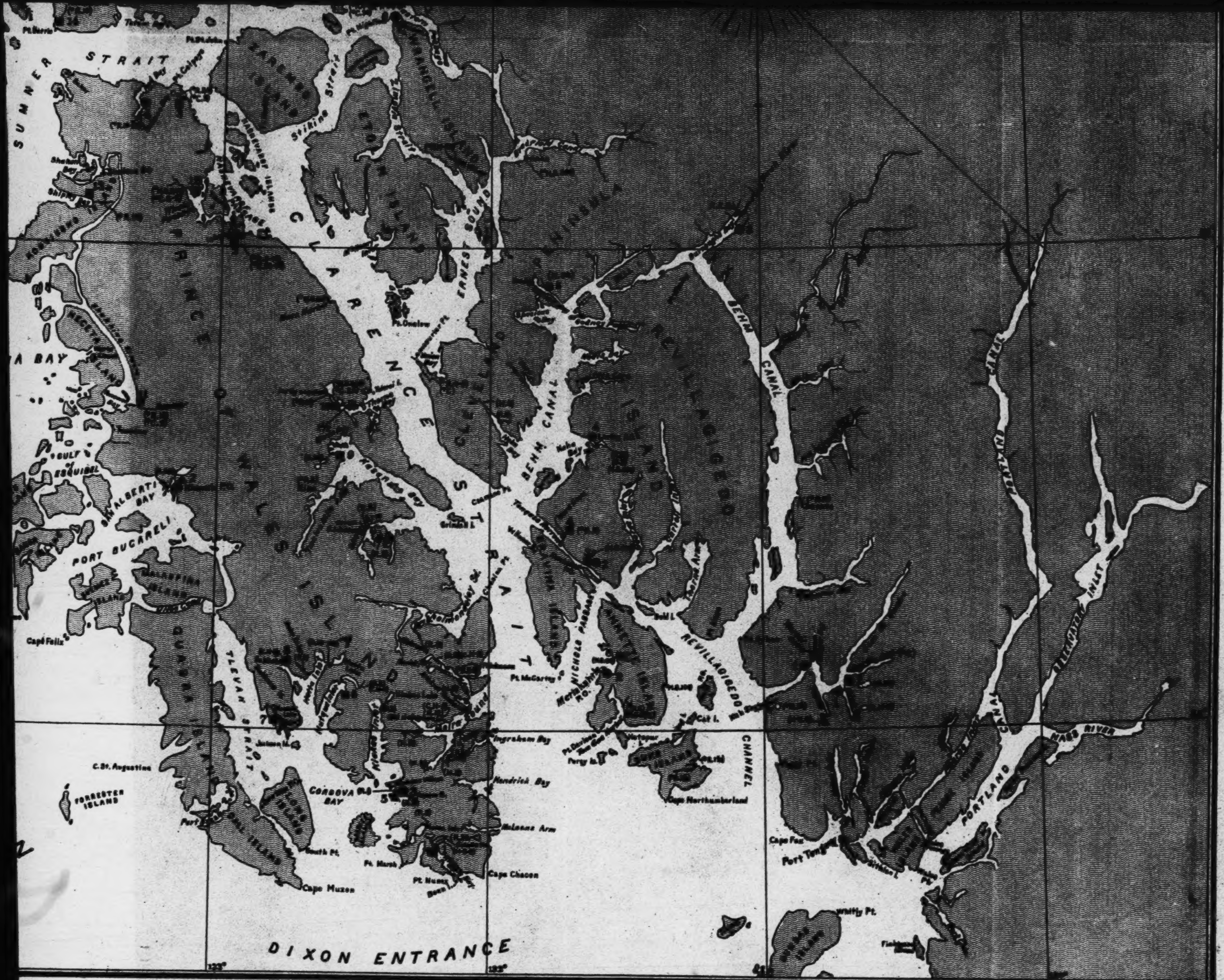
1. J. C. CALLBREATH.
2. NORTH PACIFIC TRADING & PACKING CO.
3. BARANOFF PACKING CO.

Bulletin U.S.F.C. 1898.

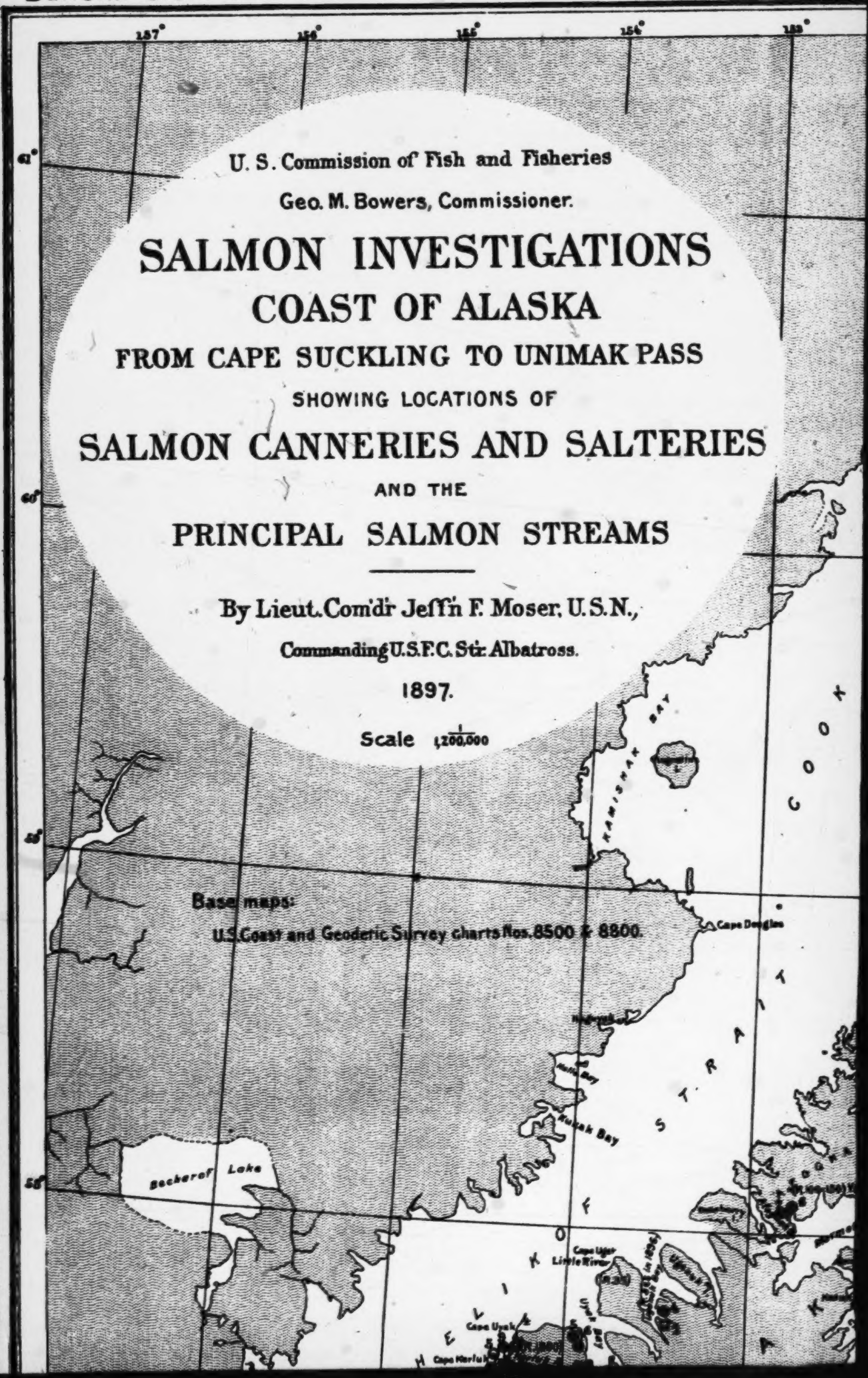

CHILKAT INLET
CHILKOOT INLET
LYNN CANAL
GLACIER BAY
ICY PASSAGE


Cape Ommaney
Pt. Harris
Affleck Canal
Port Beauclerc
Pt. Baker
Shipley Bay
Christiania Sound
Cape Decision
Hazy Islands
Helm Point
Iphigenia Bay
Gulf of Esquibel
Cape Addington
Cape Bartolome
Cape Felix
S U M N E R S
I S L A N D
P A C I F I C O C E A N
Statue Miles
Nautical Miles
56°
55°
135°
134°

[illegible]


SUMNER STRAIT
Pt. Baker
Pt. St. Albans
Zarembo Island
Stikine Strait
Etolin Island
Wrangell Island
Clarence Strait
Ernest Sound
Prince of Wales Island
Pt. Onslow
Shakan Bay
Shipley Bay
A BAY
Heceta Island
Gulf of Esquibel
San Alberti Bay
Port Bucareli
Malaspina Island
Suemez Island
Cape Felix
Kasaan Bay
Grindall I.
Cholmondeley Sd.
Moira Sound
Tlevan Strait
Sukkwan Island
Dall Island
Long Island
C. St. Augustine
Forrester Island
Cordova Bay
Port
South Pt.
Pt. Marsh
Cape Muzon
Pt. Nunez
Cape Chacon
Mallonne Arm
Hendrick Bay
Ingraham Bay
Pt. McCartey
Nichols Passage
Behm Canal
Revillagigedo Island
Revillagigedo Channel
Cat I.
Percy Is.
Duke Island
Cape Northumberland
Cape Fox
Port Tongass
Portland Canal
Nass River
Observatory Inlet
Whitly Pt.
DIXON ENTRANCE
133°
132°
131°

Bulletin U.S.F.C. 1898.



U. S. Commission of Fish and Fisheries

Geo. M. Bowers, Commissioner.

SALMON INVESTIGATIONS
COAST OF ALASKA
FROM CAPE SUCKLING TO UNIMAK PASS
SHOWING LOCATIONS OF
SALMON CANNERIES AND SALTERIES
AND THE
PRINCIPAL SALMON STREAMS

By Lieut. Com'dr Jeff'n F. Moser, U.S.N.,

Commanding U.S.F.C. Str. Albatross.

1897.

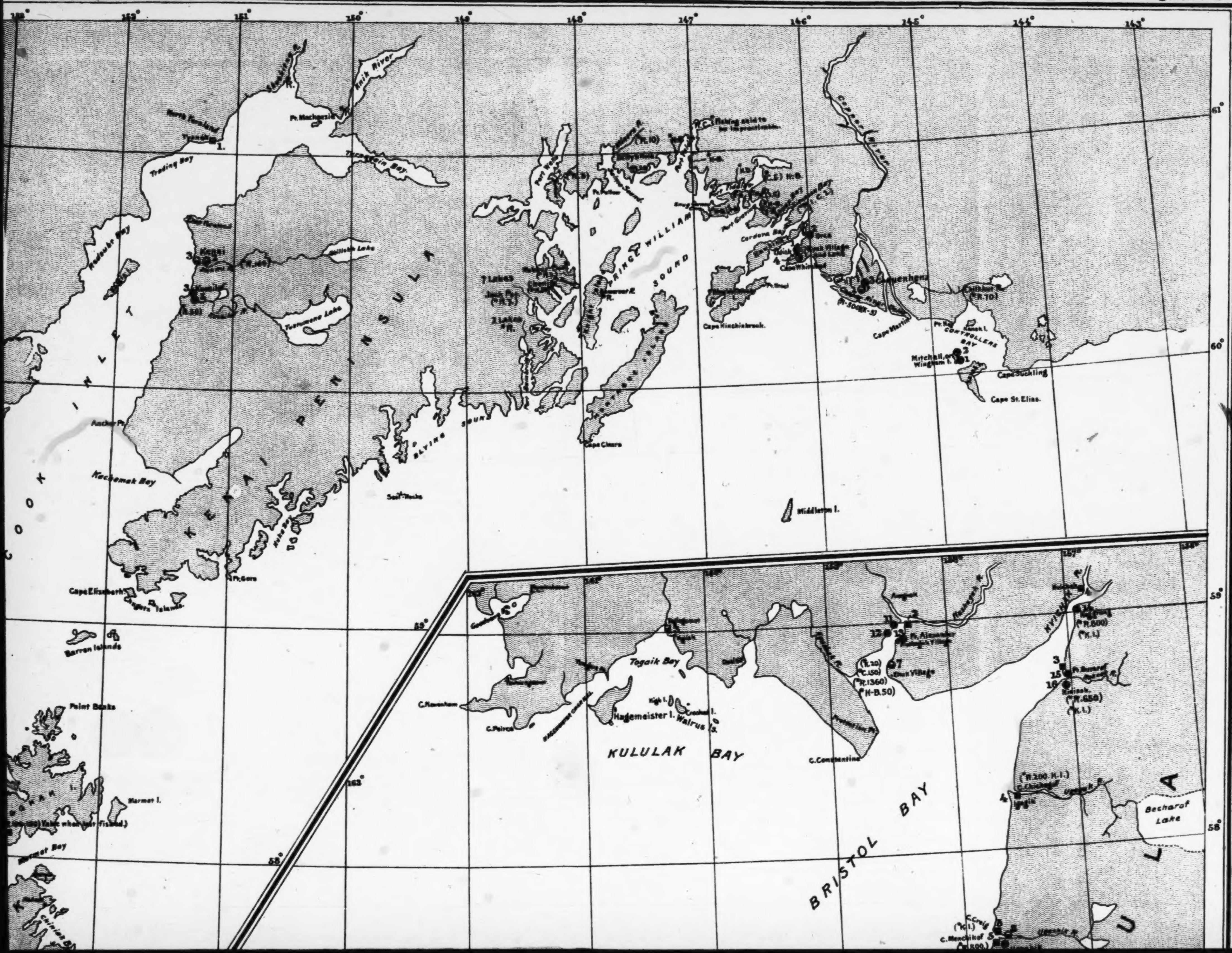
Scale $\frac{1}{1,200,000}$

Base maps:

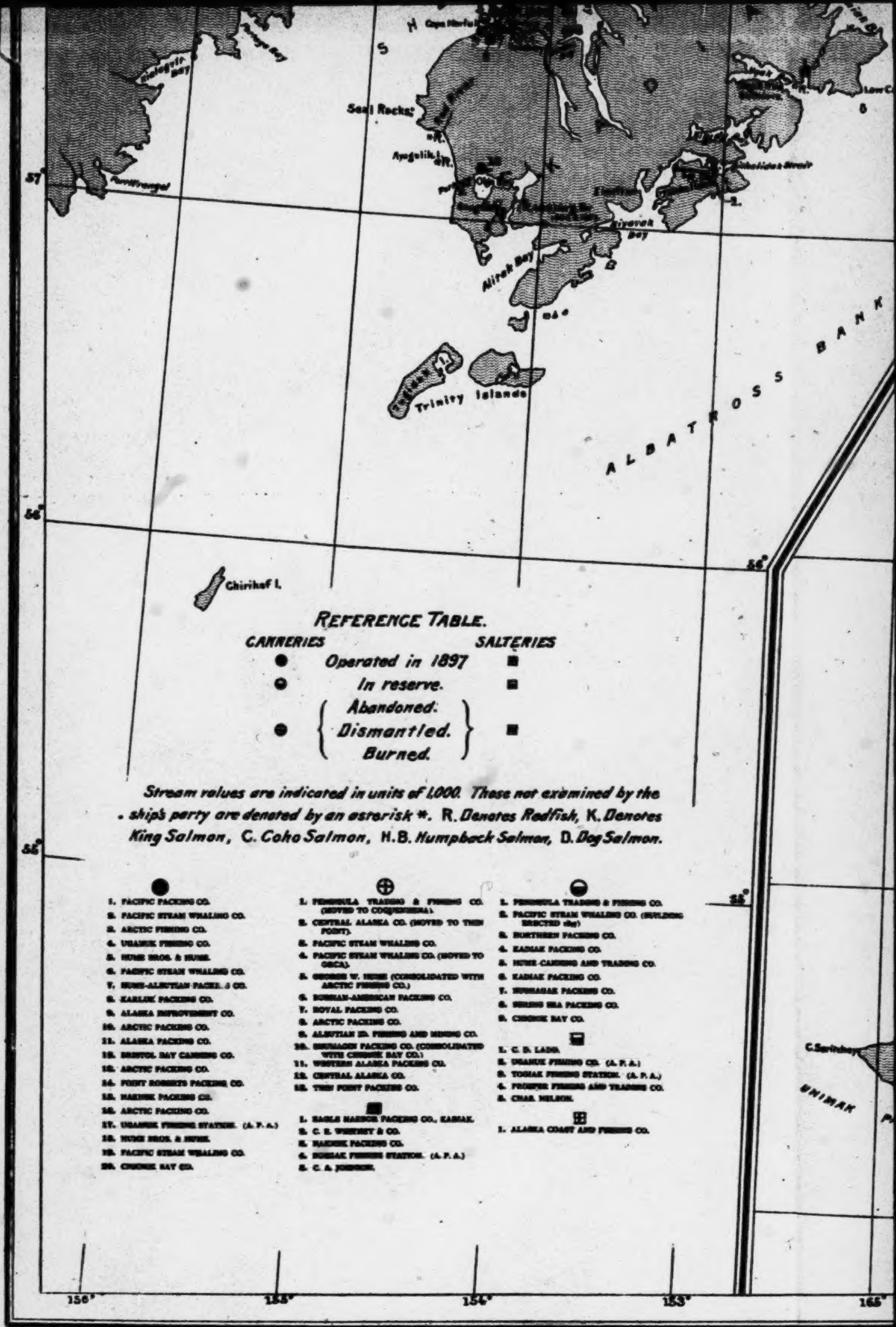
U.S. Coast and Geodetic Survey charts Nos. 8500 & 8800.

157°
156°
155°
154°
153°
61°
60°
59°
58°
Kamishak Bay
Cape Douglas
C O O K
S T R A I T
Hallo Bay
Kukak Bay
Becharof Lake
S H E L I K O F
Cape Ugat
Little River
Cape Uyak
Cape Karluk
K A K

Chart B.



151°
150°
149°
148°
147°
146°
145°
144°
143°
61°
60°
59°
58°
Knik River
Pt. Mackenzie
Tyonek
1.
Trading Bay
Turnagain Bay
Redoubt Bay
COOK INLET
3 Kenai
3
Skilak Lake
Tustumena Lake
KENAI PENINSULA
Anchor Pt.
Kachemak Bay
Seal Rocks
BLYING SOUND
Pt. Gore
Cape Elizabeth
Chugatz Islands
Barren Islands
Point Banks
Marmot I.
Marmot Bay
7 Lakes
2 Lakes
Port Wells
Pt. Pellew
PRINCE WILLIAM SOUND
Fishing said to be impracticable.
Cordova Bay
Cape Whitshed
4
Pt. Steel
Cape Hinchinbrook
Cape Cleare
Copper River
Cape Martin
(R. 300 (K.5))
Chilkat R.
(R. 70)
Pt. Hey
Kayak I.
CONTROLLERS BAY
Mitchell, or Wingham I.
2
1
Cape Suckling
Cape St. Elias.
Middleton I.
Togaik Bay
C. Newenham
C. Peirce
Hagemeister I.
High I.
Crooked I.
Walrus Is.
KULULAK BAY
C. Constantine
11
2
12
13
Ft. Alexander
7
(R. 20)
(C. 150)
(R. 1360)
(H-B. 50)
14
(R. 800)
(K. I.)
3
15
16
(R. 650)
(K. I.)
(R. 200. K. I.)
C. Chichagof
4
Becharof Lake
BRISTOL BAY
C. Craig
(K. I.)
C. Menchikof
5
(R. 500.)



REFERENCE TABLE.

CANNERIES		SALTERIES
●	Operated in 1897	■
⊖	In reserve.	▤
⊕	Abandoned. Dismantled. Burned.	⊞

*Stream values are indicated in units of 1,000. Those not examined by the ship's party are denoted by an asterisk *. R. Denotes Redfish, K. Denotes King Salmon, C. Coho Salmon, H.B. Humpback Salmon, D. Dog Salmon.*

●

1. PACIFIC PACKING CO.
2. PACIFIC STEAM WHALING CO.
3. ARCTIC FISHING CO.
4. UGASHIK FISHING CO.
5. HUME BROS. & HUME.
6. PACIFIC STEAM WHALING CO.
7. HUME-ALEUTIAN PACKG. CO.
8. KARLUK PACKING CO.
9. ALASKA IMPROVEMENT CO.
10. ARCTIC PACKING CO.
11. ALASKA PACKING CO.
12. BRISTOL BAY CANNING CO.
13. ARCTIC PACKING CO.
14. POINT ROBERTS PACKING CO.
15. NAKNEK PACKING CO.
16. ARCTIC PACKING CO.
17. UGASHIK FISHING STATION. (A. P. A.)
18. HUME BROS. & HUME.
19. PACIFIC STEAM WHALING CO.
20. CHIGNIK BAY CO.

⊕

1. PENINSULA TRADING & FISHING CO. (MOVED TO COQUENHENA).
2. CENTRAL ALASKA CO. (MOVED TO THIN POINT).
3. PACIFIC STEAM WHALING CO.
4. PACIFIC STEAM WHALING CO. (MOVED TO ORCA).
5. GEORGE W. HUME (CONSOLIDATED WITH ARCTIC FISHING CO.)
6. RUSSIAN-AMERICAN PACKING CO.
7. ROYAL PACKING CO.
8. ARCTIC PACKING CO.
9. ALEUTIAN ID. FISHING AND MINING CO.
10. SHUMAGIN PACKING CO. (CONSOLIDATED WITH CHIGNIK BAY CO.)
11. WESTERN ALASKA PACKING CO.
12. CENTRAL ALASKA CO.
13. THIN POINT PACKING CO.

■

1. EAGLE HARBOR PACKING CO., KADIAK.
2. C. E. WHITNEY & CO.
3. NAKNEK PACKING CO.
4. ALITAK FISHING STATION. (A. P. A.)
5. C. A. JOHNSON.

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1. PENINSULA TRADING & FISHING CO.
2. PACIFIC STEAM WHALING CO. (BUILDING ERECTED 1897)
3. NORTHERN PACKING CO.
4. KADIAK PACKING CO.
5. HUME CANNING AND TRADING CO.
6. KADIAK PACKING CO.
7. NUSHAGAK PACKING CO.
8. BERING SEA PACKING CO.
9. CHIGNIK BAY CO.

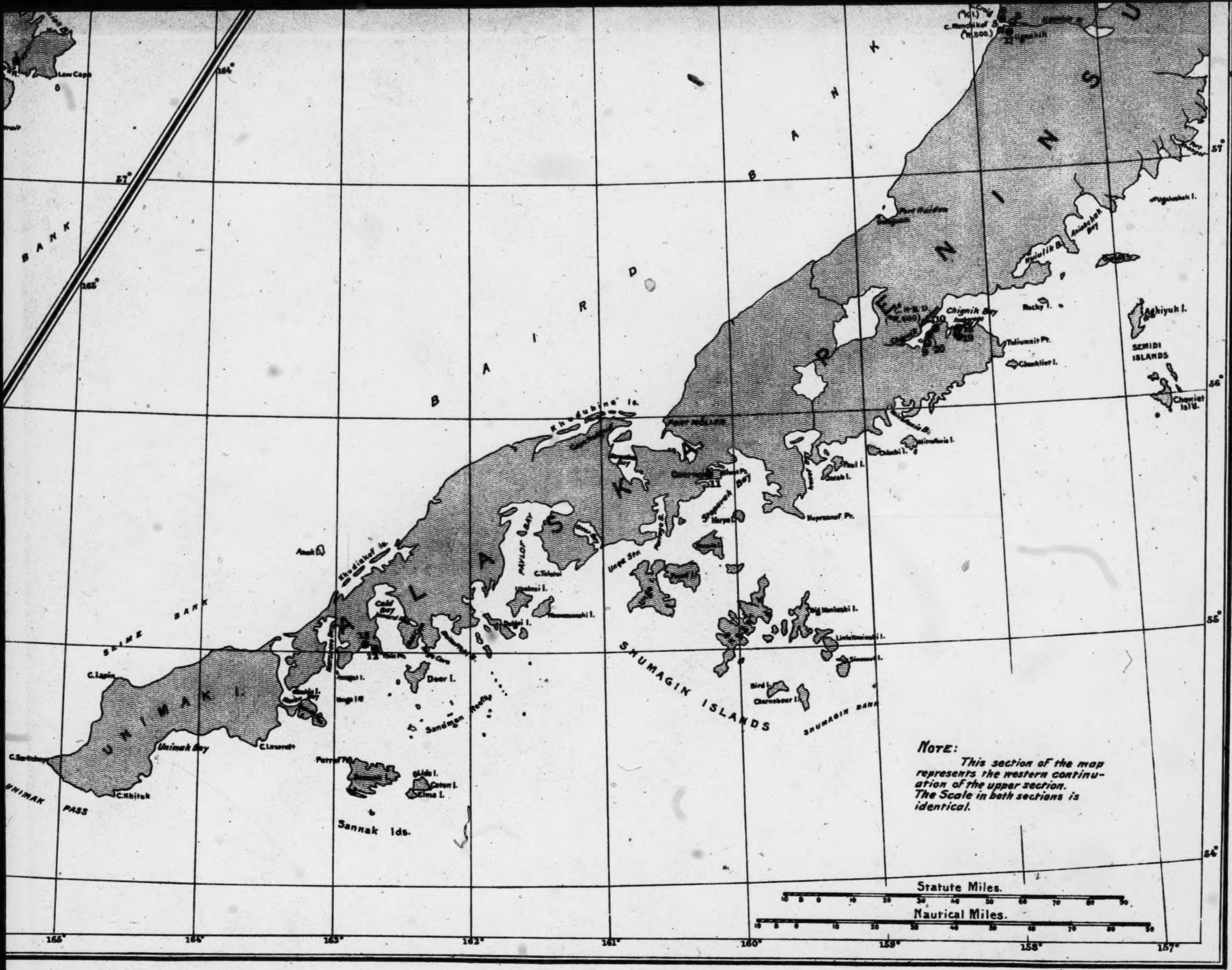
▤

1. C. D. LADD.
2. UGASHIK FISHING CO. (A. P. A.)
3. TOGIAK FISHING STATION. (A. P. A.)
4. FRONTIER FISHING AND TRADING CO.
5. CHAS. NELSON.

⊞

1. ALASKA COAST AND FISHING CO.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.


BAIRD BANK
ALASKA PENINSULA
UNIMAK I.
Unimak Bay
UNIMAK PASS
C. Sarichef
C. Khituk
C. Lapin
C. Lazaref
SLIME BANK
Khudiakof Is.
Khudubina Is.
Cold Bay
Pavlof Bay
C. Tolstoi
Unga Str.
Deer I.
Sandman Reefs
Sannak Ids.
Petrof Pt.
Caton I.
Elma I.
SHUMAGIN ISLANDS
SHUMAGIN BANK
Bird I.
Chernobour I.
Big Koniushi I.
Simeonof I.
Nagai I.
Unga I.
Popof I.
Korovin I.
Perenosa Pt.
Paul I.
Jacob I.
Chignik Bay
Tuliumnit Pt.
Chankliut I.
SEMIDI ISLANDS
Aghiyuk I.
Chowiet Isl'd.
Rocky I.
Kuiulik B.
Aniakchak Bay
Port Heiden
Ugaiushak I.
Amak I.
Low Cape
C. Menshikof
57°
56°
55°
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165°
164°
163°
162°
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160°
159°
158°
157°
Statute Miles.
10 5 0 10 20 30 40 50 60 70 80 90
Nautical Miles.
10 5 0 10 20 30 40 50 60 70 80 90

NOTE:

This section of the map represents the western continuation of the upper section. The Scale in both sections is identical.

STATISTICS OF THE ALASKAN SALMON INDUSTRY.

The following statistics of the salmon industry of Alaska comprise a continuous record of the business from 1878, the year of its origin, to 1897, when the investigations referred to in this report were made. The data are more comprehensive and useful than any heretofore published, and, besides showing the annual development of the industry in each section, will have a permanent value because of the interesting comparisons that will be possible. For the years 1896 and 1897 there are given detailed statistics of persons employed, capital invested, apparatus used, salmon utilized, and canned products prepared. Special statistics of the salmon salting conducted by independent establishments are shown for 1897.

The total quantity of salmon canned in Alaska during the twenty years ending in 1897, as shown by the following table, was 7,508,358 cases, each case holding 48 one-pound cans. The net weight of the fish thus prepared was 360,401,184 pounds, while the gross weight of the salmon required for this pack was over 500,000,000 pounds. The average annual pack was 375,418 cases, but during the last ten years of the period in question the average quantity of salmon canned was 691,743 cases and the total gross weight of the fish utilized for canning was over 470,000,000 pounds. Thus, between 1888 and 1897 the Alaskan waters yielded an average yearly output of 47,000,000 pounds of salmon for canning purposes, in addition to large quantities which were salted.

Table showing by years and districts the salmon-canning operations in Alaska from 1878 to 1897.

Year.	Southeast Alaska.	Prince William Sound and Copper River.	Cook Inlet.	Kadiak and Chignik.	Bering Sea.	Grand totals, all Alaska.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1878	8,150	....	....	....	....	8,150
1879	12,530	....	....	....	....	12,530
1880	6,539	....	....	....	....	6,539
1881	8,977	....	....	....	....	8,977
1882	11,501	....	6,044	4,200	....	21,745
1883	18,040	....	14,818	13,479	....	46,337
1884	19,189	....	21,141	20,156	400	60,886
1885	10,828	....	19,217	23,470	14,000	77,515
1886	18,160	....	28,433	46,150	48,822	141,565
1887	31,462	....	30,765	71,750	72,700	206,677
1888	81,128	....	42,451	198,650	89,886	412,115
1889	136,760	24,204	50,494	386,753	115,985	714,196
1890	142,901	42,194	28,655	350,451	118,390	682,591
1891	156,615	68,001	58,997	381,279	133,418	801,400
1892	115,722	....	20,741	274,755	63,499	474,717
1893	136,053	76,908	31,665	291,152	107,786	643,654
1894	142,544	78,663	34,033	322,356	108,844	686,440
1895	148,476	59,494	36,188	232,237	150,135	626,530
1896	262,381	92,866	34,767	358,357	218,336	966,707
1897	271,867	52,057	32,532	298,310	254,312	909,078
Total	1,739,832	494,567	490,941	3,286,505	1,496,513	7,508,358

For four years after salmon canning was begun in Alaska it was confined to the southeastern part of the Territory; in 1882 the business was inaugurated in the Cook Inlet and the Kadiak regions; two years later canning commenced in Bering Sea, and in 1889 in Prince William Sound. In all of these sections the industry has continued and has undergone a great increase, so that the pack of 1897 was larger than that of any previous year except 1896.[1] Up to and including 1897 more than two-fifths of the canned products, namely, 3,286,505 cases, had come from the Kadiak and Chignik district; somewhat more than one-fifth, or 1,739,832 cases, from southeast Alaska, and a little less than one-fifth, or 1,496,513 cases, from Bering Sea. The condensed tables showing the annual pack in each region and the proportion of the different sections in the value of the canned products afford an interesting study of the seasonal fluctuations of the business.

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[1] The Alaska salmon pack of 1898 was about 960,000 cases.

The growth of the salmon-canning business, as indicated by the number of canneries in operation each year, is shown in the following table. The acme of the business was reached in 1889, when 37 canneries were run. In 1892, for reasons elsewhere stated, the active canneries were reduced to 15, and since that year there have been numbers of canneries held in reserve in the most important districts. Owing to the establishment of new canneries and the reopening of old ones, the plants operated in 1896 and 1897 were more numerous than in any season since 1891.

Table showing by years the number of canneries operated in each district of Alaska from 1878 to 1897.

Years.	Southeast Alaska.	Prince William Sound and Copper River.	Cook Inlet.	Kadiak and Chignik.	Bering Sea.	Total.
1878	2	....	....	....	....	2
1879	2	....	....	....	....	2
1880	1	....	....	....	....	1
1881	1	....	....	....	....	1
1882	1	....	1	1	....	3
1883	4	....	1	1	....	6
1884	4	....	1	1	1	7
1885	3	....	1	1	1	6
1886	4	....	1	1	3	9
1887	5	....	1	1	3	10
1888	6	....	2	4	4	16
1889	12	4	2	15	4	37
1890	12	3	2	14	4	35
1891	11	3	3	8	5	30
1892	7	....	1	5	2	15
1893	8	3	1	7	3	22
1894	7	3	1	6	4	21
1895	7	3	1	6	6	23
1896	9	3	1	8	8	29
1897	9	2	1	10	7	29

The number of salmon canneries in operation in 1897 was 29, divided as follows among the different districts: Southeast Alaska, 9; Prince William Sound and Copper River, 2; Cook Inlet, 1; Kadiak and Chignik, 10, and Bering Sea, 7. In the previous year, also, 29 canneries were operated, 9 being in southeast Alaska, 3 on Prince William Sound and Copper River, 1 on Cook Inlet, 8 at Kadiak and Chignik, and 8 in Bering Sea.

The number of persons employed in the Alaskan salmon-canning business in 1897 was 5,252. Of these, 1,148 were white fishermen, 759 native fishermen, 312 white cannery employes, 439 native cannery hands, 2,268 Chinese cannery hands, and 326 hatchery men, crews of cannery launches and other vessels, and various other employees. The persons employed in various capacities in each district numbered as follows: Southeast Alaska, 1,829; Prince William Sound and Copper River, 364; Cook Inlet, 173; Kadiak and Chignik, 1,577, and Bering Sea, 1,309.

The amount of invested capital represented by the Alaskan salmon industry is very large. The value of the vessels, boats, fishing gear, buildings, machinery, etc., including the canneries not operated but held in reserve, aggregated approximately $3,623,200 in 1897, apportioned as follows among the different districts: Southeast Alaska, $597,400; Prince William Sound and Copper River, $263,500; Cook Inlet, $154,300; Kadiak and Chignik, $1,741,000, and Bering Sea, $867,000. By far the largest item in the investment was the cannery buildings and equipment, which had a value of $2,630,860. The other leading items were vessels and boats, $836,100; 544 gill nets, $69,470; 48 traps, $48,050, and 133 seines, $38,680.

Table showing the output of the salmon canneries of Alaska from 1878 to 1897.

Name of company and location of cannery.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
SOUTHEAST ALASKA.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Cape Fox Packing Co., north shore Boca de Quadra						Packs unknown.	
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island	5,402	6,675	6,539	8,977	11,501	8,240	6,189
Cutting Packing Co., Old Sitka, Baranof Island	2,757	5,855	Closed.	Closed.	(1)		
Chilkat Packing Co., east shore Chilkat Inlet						6,000	7,000
Northwest Trading Co., Pyramid Harbor, Chilkat Inlet						3,800	6,000
Totals of annual packs in southeast Alaska	8,159	12,530	6,539	8,977	11,501	[2]18,040	[2]19,189
COOK INLET.							
Alaska Packing Co., Kussilof River, Cook Inlet					6,044	14,818	21,141
KADIAK AND CHIGNIK.							
Karluk Packing Co., Karluk, Kadiak Island					4,200	13,479	20,156
BERING SEA.							
Arctic Packing Co., Nushagak River, Bristol Bay							[3]400

Name of company and location of cannery.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
SOUTHEAST ALASKA.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Cape Fox Packing Co., north shore Boca de Quadra	Packs unknown.		New company; moved to Ketchikan in 1887.				
Tongass Packing Co., Ketchikan, Tongass Narrows			5,500	11,000	13,000	Burnt, Aug., 1889.	
Metlakahtla Industrial Co., Metlakahtla, Annette Island						[3]500	7,000
Alaska Salmon Packing and Fur Co., Loring, Naha Bay				18,771	28,862	23,024	22,786
Boston Fishing and Trading Co., Yes or McDonald Bay					4,500	9,343	17,365
Cape Lees Packing Co., Burroughs Bay, Behm Canal				5,732	10,574	10,823	
Aberdeen Packing Co., Stikine River			3,400	14,000	Moved; new company.		
Glacier Packing Co., Point Highfield, Wrangell Island					13,800	14,600	15,876
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island	8,428	7,860	9,562	12,325	11,370	10,188	9,256
Baranoff Packing Co., Redoubt, Baranof Island					4,454	10,123	Moved.
Baranoff Packing Co., Redfish Bay, Baranof Island							7,949
Astoria and Alaska Packing Co., Freshwater Bay, Chichagof Island					Unknown.	Moved.	
Astoria and Alaska Packing Co., Point Ellis, Kuiu Island						8,000	16,200
Bartlett Bay Packing Co., Bartlett Bay, Icy Straits					4,300	12,000	7,600
Chilkat Packing Co., east shore Chilkat Inlet	2,400	1,700	8,000	Closed.	13,500	15,000	13,300
Chilkat Canning Co., Chilkat Village, Chilkat Inlet					19,000	17,000	20,914
Northwest Trading Co., Pyramid Harbor, Chilkat Inlet	Closed.	8,600	5,000	New Co.			
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet				19,300	[4]13,400	12,300	18,300
Totals of annual packs in southeast Alaska	[2]10,828	[2]18,160	31,462	81,128	[2]136,760	142,901	156,615
PRINCE WILLIAM SOUND AND COPPER RIVER.							
Central Alaska Co., Little Kayak Island, Gulf of Alaska					1,600	Moved to Thin Point	
Peninsula Trading and Fishing Co., Little Kayak Island, Gulf of Alaska					2,540	14,200	Moved.
Peninsula Trading and Fishing Co., Coquenhena, Copper River Delta							18,065
Pacific Packing Co., Odiak, Prince William Sound					5,064	13,716	27,209
Pacific Steam Whaling Co., Odiak, Prince William Sound					15,000	14,278	22,797
Totals of annual packs in Prince William Sound and Copper River					24,204	42,194	68,001
COOK INLET.							
Northern Packing Co., Kenai				12,996	18,712	15,905	18,254
George W. Hume, Kussilof River						12,750	21,586
Alaska Packing Co., Kussilof River	NewCo.						
Arctic Fishing Co., Kussilof River	19,217	28,433	30,705	29,455	31,782	(5)	19,157
Totals of annual packs in Cook Inlet	19,217	28,433	30,705	42,451	50,494	28,655	58,997
KADIAK AND CHIGNIK.							
Kodiak Packing Co., Karluk, Kadiak Island				26,146	30,287	43,000	41,000
Hume Packing Co., Karluk, Kadiak Island					28,000	37,613	36,247
Aleutian Islands Fishing and Mining Co., Karluk, Kadiak Island				33,700	53,551	40,335	[6]39,312
Karluk Packing Co., Karluk, Kadiak Island	33,470	46,150	71,750	101,304	62,057	40,306	66,483
Alaska Improvement Co., Karluk, Kadiak Island					25,600	26,000	26,000
Arctic Packing Co., Alitak Bay, Kadiak Island					13,850	17,800	26,600
Kodiak Packing Co., Alitak Bay, Kadiak Island					12,535	16,347	(7)
Arctic Packing Co., Larsen Cove, Uyak Bay				37,500	44,200	37,600	[8]41,000
Royal Packing Co., Afognak Island					16,412	9,926	(9)
Russian-American Packing Co., Afognak Island					25,500	26,500	[10]25,000
Chignik Bay Co., Chignik Bay, Alaska Peninsula					21,500	14,455	24,730
Shumagin Packing Co., Chignik Bay, Alaska Peninsula					11,200	[11]14,455	[11]24,832
Chignik Bay Packing Co., Chignik Bay, Alaska Peninsula					10,500	[11]14,455	[11]24,780
Western Alaska Packing Co., Ozernoi, Stepovak Bay, Alaska Peninsula					6,400	2,198	Aband'd.
Thin Point Packing Co., Thin Point, Alaska Peninsula					25,161	2,401	4,206
Central Alaska Co., Thin Point, Alaska Peninsula						7,000	4,089
Totals of annual packs in Kadiak and Chignik	33,470	46,150	71,750	198,650	386,753	350,451	384,279
BERING SEA.							
Arctic Packing Co., Nushagak River, Bristol Bay	14,000	19,000	24,000	25,000	25,000	33,000	30,883
Alaska Packing Co., Nushagak River, Bristol Bay		16,500	27,500	19,000	30,000	31,000	31,077
Bristol Bay Canning Co., Nushagak River, Bristol Bay		13,322	21,200	30,000	33,221	30,400	37,100
Nushagak Packing Co., Nushagak River, Bristol Bay				15,886	27,764	23,990	30,363
Bering Sea Packing Co., Ugashik River, Bristol Bay							3,995
Totals of annual packs in Bering Sea	14,000	48,822	72,700	89,886	115,985	118,390	133,418

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[1] Machinery moved; site abandoned.

[2] The records for the southeast Alaska district for 1883, 1884, 1885, 1886, and 1889 lack the pack of one small cannery each, the output of which can not be ascertained.

[3] Experimental pack.

[4] Burnt and rebuilt in spring.

[5] Vessel lost; closed.

[6] Packed in cannery of Hume Packing Co. at Karluk.

[7] Consolidated with the Arctic Packing Company.

[8] Packed in cannery of Kodiak Packing Company at Karluk.

[9] The quota of fish for the Royal Packing Company at Afognak was packed by the Karluk Packing Company at Karluk.

[10] Packed in cannery of Alaska Improvement Company at Karluk.

[11] Packed in cannery of Chignik Bay Company.

Table showing the output of the salmon canneries of Alaska from 1878 to 1897—Continued.

Name of company and location of cannery.	1892.	1893.	1894.	1895.	1896.	1897.
SOUTHEAST ALASKA.						
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Quadra Packing Co., Mink Bay, Boca de Quadra					8,000	24,500
Metlakahtla Industrial Co., Metlakahtla, Annette Island	11,125	12,500	14,000	12,000	17,650	15,490
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island					27,442	34,388
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	21,446	25,153	26,869	32,554	61,467	62,040
Boston Fishing and Trading Co., Yes or McDonald Bay	13,734	15,192	12,000	14,100	24,100	22,300
Cape Lees Packing Co., Burroughs Bay, Behm Canal	Closed.	Closed.	Dismantled.			
Glacier Packing Co., Point Highfield, Wrangell Island	Closed.	22,728	25,250	27,416	44,233	45,918
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island	10,194	12,505	14,455	12,228	16,675	15,705
Baranoff Packing Co., Redfish Bay, Baranof Island	10,250	9,889	11,189	14,805	15,358	14,070
Astoria and Alaska Packing Co., Point Ellis, Kuiu Island	Burnt.[1]					
Bartlett Bay Packing Co., Bartlett Bay, Icy Straits	Closed.	Closed.	Dismantled.			
Chilkat Packing Co., east shore Chilkat Inlet	Burnt.					
Chilkat Canning Co., Chilkat Village, Chilkat Inlet	20,000	24,418	Closed.	Closed.	Closed.	Closed.
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet	28,964	13,668	38,781	35,373	47,456	37,456
Totals of annual packs in southeast Alaska	115,722	136,053	142,544	148,476	262,381	271,867
PRINCE WILLIAM SOUND AND COPPER RIVER.						
Peninsula Trading and Fishing Co., Coquenhena, Copper River Delta	Closed.	15,270	15,000	15,000	20,672	Closed.
Pacific Packing Co., Odiak, Prince William Sound	Closed.	28,909	28,378	21,453	39,873	23,301
Pacific Steam Whaling Co., Odiak, Prince William Sound	Closed.	32,729	35,285	Moved.		
Pacific Steam Whaling Co., Orca, Prince William Sound				23,041	32,321	28,756
Totals of annual packs in Prince William Sound and Copper River		76,908	78,663	59,494	92,866	52,057
COOK INLET.						
Northern Packing Co., Kenai	Closed.	Closed.	Closed.	Closed.	Closed.	Closed.
Pacific Steam Whaling Co., Kenai						[2]
George W. Hume, Kussilof River	20,741	Closed.	[3]			
Arctic Fishing Co., Kussilof River	Closed.	31,665	34,033	36,188	34,767	32,532
Totals of annual packs in Cook Inlet	20,741	31,665	34,033	36,188	34,767	32,532
KADIAK AND CHIGNIK.						
Kodiak Packing Co., Karluk, Kadiak Island	Closed.	30,138	Closed.	Closed.	Closed.	Closed.
Aleutian Islands Fishing and Mining Co., Karluk, Kadiak Island	Consol.					
Hume Aleutian Packing Co., Karluk, Kadiak Island	76,233	59,930	79,000	47,500	70,320	49,633
Karluk Packing Co., Karluk, Kadiak Island	75,416	59,220	79,000	48,379	68,495	54,777
Alaska Improvement Co., Karluk, Kadiak Island	52,098	43,076	54,300	25,700	87,613	49,852
Hume Canning and Trading Co., Tanglefoot Bay, near Karluk		15,429	26,984	15,277	Closed.	Closed.
Arctic Packing Co., Alitak Bay, Kadiak Island	21,077	25,777	27,720	15,331	23,155	37,401
Kodiak Packing Co., Alitak Bay, Kadiak Island		Mach. moved.				
Pacific Steam Whaling Co., Uyak Anchorage, Kadiak Island						17,000
Hume Bros. & Hume, Uyak Anchorage, Kadiak Island						13,375
Arctic Packing Co., Larsen Cove, Uyak Bay	Closed.	Closed.	Closed.	Closed.	Mach. moved.	
Uganuk Fishing Station, Uganuk Bay, Kadiak Island					21,005	2,113
Royal Packing Co., Afognak Island	Closed; inoperative by President's proclamation creating a Fish Commission reservation.				Mach. moved.	
Russian-American Packing Co., Afognak Island					Disman.	
Chignik Bay Co., Chignik Bay, Alaska Peninsula	49,931	57,553	55,352	70,050	46,361	38,159
Shumagin Packing Co., Chignik Bay, Alaska Peninsula	Consol.					
Chignik Bay Packing Co., Chignik Bay, Alaska Peninsula	Closed.	Closed.	Closed.	Closed.	Closed.	Closed.
Hume Bros. & Hume, Chignik Bay, Alaska Peninsula					17,893	12,000
Pacific Steam Whaling Co., Chignik Bay, Alaska Peninsula					21,515	24,000
Thin Point Packing Co., Thin Point, Alaska Peninsula	Closed.	Closed.	Disman.			
Central Alaska Co., Thin Point, Alaska Peninsula	Closed.	Closed.	Closed.	Disman.		
Totals of annual packs in Kadiak and Chignik	274,755	291,152	322,356	232,237	358,357	298,310
BERING SEA.						
Arctic Packing Co., Nushagak River, Bristol Bay	Closed.	35,848	30,413	33,631	35,676	35,890
Alaska Packing Co., Nushagak River, Bristol Bay	31,859	37,188	30,038	34,632	39,115	37,849
Bristol Bay Canning Co., Nushagak River, Bristol Bay	31,640	34,750	30,909	33,434	38,314	34,117
Nushagak Packing Co., Nushagak River, Bristol Bay	Closed.	Closed.	Closed.	Closed.	Closed.	Closed.
Point Roberts Packing Co., Kvichak River, Bristol Bay					29,730	55,508
Arctic Packing Co., Naknek River, Bristol Bay				22,731	27,133	34,676
Naknek Packing Co., Naknek River, Bristol Bay				13,700	8,600	18,000
Bering Sea Packing Co., Ugashik River, Bristol Bay	Closed.	Closed.	17,394	12,007	20,004	Closed.
Ugashik Fishing Station, Ugashik River, Bristol Bay					19,704	38,272
Totals of annual packs in Bering Sea	63,499	107,786	108,844	150,135	218,336	254,312

[1] Burnt May 1.

[2] Buildings erected.

[3] Consolidated with the Arctic Fishing Company.

Summary showing output of Alaskan salmon-packing companies since organization, together with their ownership in 1897.

Name of company and location of cannery.	Owned in 1897 by—	Total output since organization.
SOUTHEAST ALASKA.		*Cases.*
Cape Fox Packing Co., Boca de Quadra	Defunct	
Quadra Packing Co., Boca de Quadra	Same Co	32,500
Tongass Packing Co., Tongass Narrows	Defunct	29,500
Metlakahtla Industrial Co., Annette Isl'd.	Same Co	90,265
Pacific Steam Whaling Co., Prince of Wales Island.	do	61,830
Alaska Salmon Packing and Fur Co., Naha Bay.	A. P. A	322,972
Boston Fishing and Trading Co., Yes Bay	Same Co	132,544
Cape Lees Packing Co., Burroughs Bay	Defunct	27,129
Aberdeen Packing Co., Stikine River	do	17,400
Glacier Packing Co., Wrangell Island	A. P. A	209,821
North Pacific Trading and Packing Co., Klawak.	Same Co	204,364
Baranoff Packing Co., Redoubt, Baranof Island.	Defunct	14,577
Baranoff Packing Co., Redfish Bay, Baranof Island.	Same Co	83,519
Cutting Packing Co., Old Sitka, Baranof Island.	Defunct	8,612
Astoria and Alaska Packing Co., Chichagof Island.	Defunct	
Astoria and Alaska Packing Co., Kuiu Isl'd.	Defunct	24,200
Bartlett Bay Packing Co., Bartlett Bay	do	23,900
Chilkat Packing Co., Chilkat Inlet	A. P. A	66,969
Chilkat Canning Co., Chilkat Inlet	do	101,332
Northwest Trading Co., Chilkat Inlet	Defunct	23,400
Pyramid Harbor Packing Co., Chilkat Inlet	A. P. A	264,998
Total		[1] 1,739,832
PRINCE WILLIAM SOUND AND COPPER RIVER.		
Central Alaska Co., Little Kayak Island	Defunct	1,600
Peninsula Trading and Fishing Co., Little Kayak Island.	Defunct	16,740
Peninsula Trading and Fishing Co., Coquenhena.	P. S. W. Co	84,027
Pacific Packing Co., Odiak	A. P. A	187,993
Pacific Steam Whaling Co., Odiak	Defunct	120,089
Pacific Steam Whaling Co., Orca	Same Co	84,118
Total		494,567
COOK INLET.		
Northern Packing Co., Kenai	A. P. A	65,867
Pacific Steam Whaling Co., Kenai	Same Co	
George W. Hume, Kussilof River	A. P. A	55,077
Alaska Packing Co., Kussilof River	Defunct	42,003
Arctic Fishing Co., Kussilof River	A. P. A	327,994
Total		490,941
KADIAK AND CHIGNIK.		*Cases.*
Kodiak Packing Co., Karluk	A. P. A	170,631
Hume Packing Co., Karluk	Defunct	101,860
Aleutian Islands Fishing and Mining Co., Karluk.	Defunct	166,898
Hume-Aleutian Packing Co., Karluk	A. P. A	382,645
Karluk Packing Co., Karluk	do	844,642
Alaska Improvement Co., Karluk	do	400,239
Hume Canning and Trading Co., Tanglefoot Bay, near Karluk.	do	57,690
Arctic Packing Co., Alitak Bay	do	208,711
Kodiak Packing Co., Alitak Bay	do	28,882
Pacific Steam Whaling Co., Uyak Anchorage.	Same Co	17,000
Hume Bros. & Hume, Uyak Anchorage.	do	13,375
Arctic Packing Co., Larsen Cove	A. P. A	160,300
Uganuk Fishing Station, Uganuk Bay	do	23,118
Royal Packing Co., Afognak Island	do	26,338
Russian-American Packing Co., Afognak Island.	do	77,000
Chignik Bay Co., Chignik Bay	do	380,091
Shumagin Packing Co., Chignik Bay	Defunct	50,487
Chignik Bay Packing Co., Chignik Bay	A. P. A	49,735
Hume Bros. & Hume, Chignik Bay	Same Co	29,893
Pacific Steam Whaling Co., Chignik Bay.	do	45,515
Western Alaska Packing Co., Ozernoi, Stepovak Bay.	Defunct	8,598
Thin Point Packing Co., Thin Point	do	31,768
Central Alaska Co., Thin Point	do	11,089
Total		3,286,505
BERING SEA.		
Arctic Packing Co., Nushagak River	A. P. A	342,741
Alaska Packing Co., Nushagak River	do	365,758
Bristol Bay Canning Co., Nushagak River.	do	368,497
Nushagak Packing Co., Nushagak River.	do	98,003
Point Roberts Packing Co., Kvichak River.	do	85,238
Arctic Packing Co., Naknek River	do	84,540
Naknek Packing Co., Naknek River	Same Co	40,300
Bering Sea Packing Co., Ugashik River	A. P. A	53,400
Ugashik Fishing Station, Ugashik River.	do	58,036
Total		1,496,513
Grand total		7,508,358

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[1] The records for the southeast Alaska district for 1883, 1884, 1885, 1886, and 1889 lack the pack of one small cannery each, the output of which can not be ascertained.

Annual per cent value of total salmon pack (canned) of Alaska for each district, from beginning of canning operations, 1878, to close of season of 1897.

Years.	Southeast Alaska.			Prince William Sound and Copper River.	Cook Inlet.	Kadiak and Chignik.			Bering Sea.
	Lower.	Upper.	Total.			Kadiak and Afognak islands.	Alaska Peninsula.	Total.	
1878	66.2	33.8	100						
1879	53.3	46.7	100						
1880	100		100						
1881	100		100						
1882	52.9		52.9		27.8	19.3		19.3	
1883	17.8	21.2	39		32	29		29	
1884	10.2	21.3	31.5		34.7	33.1		33.1	0.7
1885	10.9	3.1	14		24.8	43.2		43.2	18
1886	5.5	7.3	12.8		20.1	32.6		32.6	34.5
1887	8.9	6.3	15.2		14.9	34.7		34.7	35.2
1888	15	4.7	19.7		10.3	48.2		48.2	21.8
1889	11.5	7.6	19.1	3.4	7.1	43.7	10.5	54.2	16.2
1890	10	10.9	20.9	6.2	4.2	43.3	8	51.3	17.4
1891	9	10.5	19.5	8.5	7.4	37.7	10.3	48	16.6
1892	11.9	12.5	24.4		4.3	47.4	10.5	57.9	13.4
1893	13.7	7.4	21.1	12	4.9	36.3	8.9	45.2	16.8
1894	13.5	7.3	20.8	11.4	5	38.9	8.1	47	15.8
1895	15.7	8	23.7	9.6	5.7	25.9	11.2	37.1	23.9
1896	20.6	6.5	27.1	9.6	3.6	28	9.1	37.1	22.6
1897	24.2	5.7	29.9	5.7	3.6	24.6	8.2	32.8	28
Average for 20 years	15	8.2	23.2	6.6	6.5	35.7	8.1	43.8	19.9

Table showing the salmon pack of the Alaska canneries for 1896.

Name of company and location of cannery.	Daily capacity (cases).	Redfish.				Cohoes.			
		Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.	Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.
Quadra Packing Co., Mink Bay, Boca de Quadra	500	8,000							
Metlakahtla Industrial Co., Metlakahtla, Annette Island	600	8,730	12	July 1	Sept. 5	1,500	6 to 7	Aug. 1	Sept. 10
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island.	800	15,386	10.3	July 10	Sept. 20	5,654	7	Aug. 1	Sept. 26
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	1,800	19,621	11	June 19	Aug. 31	3,029	9	Aug. 5	Sept. 15
Boston Fishing and Trading Co., Yes or McDonald Bay	800	7,000	9	July 11	Aug. 25	2,100	6	Aug. 20	Sept. 15
Glacier Packing Co., Point Highfield, Wrangell Island	1,500	12,584	9.88	June 22	Aug. 31	11,010	8.3	July 1	Sept. 16
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island.	500	14,089	13	June 19	Aug. 23	2,073	8 to 9	Aug. 15	Sept. 25
Baranoff Packing Co., Redfish Bay, Baranof Island	500	9,338	11	June 22	Aug. 20	2,157	5	Aug. 15	Sept. 21
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet.	1,600	44,044	10.3	June 25	Sept. 12	612	7.5	Aug. 28	Sept. 12
Peninsula Trading and Fishing Co., Coquenhena, Copper River Delta.	800	20,558	10	May 20	July 25				
Pacific Packing Co., Odiak, Prince William Sound	1,500	29,500	9.6	May 10	Aug. 30	217	9	Aug. 9	Aug. 27
Pacific Steam Whaling Co., Orca, Prince William Sound	1,500	23,445	9.5	May 15	July 31	4,021	7.5	Aug. 13	Sept. 14
Arctic Fishing Co., Kussilof River, Cook Inlet	1,500	23,367	13.2	May 25	Aug. 14	2,300	12	July 20	Aug. 14
Hume-Aleutian Packing Co., Karluk, Kadiak Island	2,600	70,320	12	June 5	Sept. 18				
Karluk Packing Co., Karluk, Kadiak Island	2,600	68,495	12	June 5	Sept. 18				
Alaska Improvement Co., Karluk, Kadiak Island	1,500	87,613	12	June 10	Sept. 15				
Arctic Packing Co., Alitak Bay, Kadiak Island	1,500	23,155	12	June 11	Aug. 28				
Uganuk Fishing Station, Uganuk Bay, Kadiak Island	1,400	21,005	10	June 10	July 26				
Chignik Bay Co., Chignik Lagoon, Chignik Bay	2,600	45,281	10	June 16	Aug. 25	2,204	11	Aug. 18	Sept. 5
Hume Bros. & Hume, Anchorage Bay, Chignik Bay	800	17,643	10	June 16	Aug. 25	50	11	Scattering through season.	
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	800	18,500	10	June 18	Aug. 25	90	11	July 18	Aug. 15
Arctic Packing Co., Nushagak River, Bering Sea	2,000	No data for 1896.							
Alaska Packing Co., Nushagak River, Bering Sea	2,000								
Bristol Bay Canning Co., Nushagak River, Bering Sea	2,000								
Point Roberts Packing Co., Kvichak River, Bering Sea	2,000								
Arctic Packing Co., Naknek River, Bering Sea	1,800								
Naknek Packing Co., Naknek River, Bering Sea	1,500								
Bering Sea Packing Co., Ugashik River, Bering Sea	1,200								
Ugashik Fishing Station, Ugashik River, Bering Sea	1,800								

Name of company and location of cannery.	Humpbacks.				King and dog salmon.			
	Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.	Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.
Metlakahtla Industrial Co., Metlakahtla, Annette Island	7,420	21 to 22	July 21	Aug. 22				
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island.	6,402	19	July 21	Aug. 29				
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	38,365	20 to 21	July 18	Aug. 31	Dog. 452	6.5	July 18	Aug. 6
Boston Fishing and Trading Co., Yes or McDonald Bay	15,000	16	Aug. 5	Sept. 5				
Glacier Packing Co., Point Highfield, Wrangell Island	19,652	18.4	July 1	Aug. 29	King, 987	4	May 15	June 22
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island.	513	22	July 24	Aug. 10				
Baranoff Packing Co., Redfish Bay, Baranof Island	3,863	23	July 19	Aug. 31				
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet.					King, 2,800	3.1	May 25	June 25
Peninsula Trading and Fishing Co., Coquenhena, Copper River Delta.					King, 114	2.5	May 20	June 1
Pacific Packing Co., Odiak, Prince William Sound	9,940	22	July 8	Aug. 24	King, 216	3.8	May 6	June 14
Pacific Steam Whaling Co., Orca, Prince William Sound	4,855	18.7	July 9	July 26				
Arctic Fishing Co., Kussilof River, Cook Inlet	2,100	18	July 15	Aug. 10	King, 7,000	2.6	May 25	July 25
Chignik Bay Co., Chignik Lagoon, Chignik Bay	[1]876		Aug. 5	Sept. 1				
Hume Bros. & Hume, Anchorage Bay, Chignik Bay	200	20	July 20	Aug. 20				
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	2,800	20	July 20	Aug. 20	King, 125	3	Scattering through season.	

[1] Humpback and dog salmon.

Table showing the salmon pack of the Alaska canneries for 1897.

Name of company and location of cannery.	Daily capacity (cases).	Redfish.				Cohoes.			
		Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.	Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.
Quadra Packing Co., Mink Bay, Boca de Quadra	500	7,500	....			3,000	....		
Metlakahtla Industrial Co., Metlakahtla, Annette Island	600	7,090	....	July 8	Sept. 2	840	....	July 20	Sept. 2
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island.	800	13,162	13	June 27	Sept. 25	5,300	7	Aug. 16	Sept. 25
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	1,800	10,470	11.5	June 25	Sept. 2	2,308	8.5	Aug. 8	Sept. 20
Boston Fishing and Trading Co., Yes or McDonald Bay	800	6,754	9	July 12	Sept. 4	1,644	6	Aug. 16	Sept. 12
Glacier Packing Co., Point Highfield, Wrangell Island	1,500	7,428	9.5	June 25	Aug. 6	8,620	8.8	July 7	Sept. 15
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island.	500	9,520	12	June 26	Aug. 31	1,995	8 to 9	Aug. 18	Sept. 20
Baranoff Packing Co., Redfish Bay, Baranof Island	500	4,058	11	June 27	Aug. 28	1,576	5	Aug. 21	Sept. 14
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet.	1,600	31,241	10.3	June 25	Sept. 13	1,488	7.5	Aug. 29	Sept. 13
Pacific Packing Co., Odiak, Prince William Sound	1,500	13,315	12.7	May 6	Aug. 10	....	....	....	....
Pacific Steam Whaling Co., Orca, Prince William Sound	1,500	21,927	9.5	May 13	July 31	3,414	7.5	Aug. 12	Sept. 13
Arctic Fishing Co., Kussilof River, Cook Inlet	1,500	24,701	14.1	May 25	Aug. 12	2,313	12.1	July 20	Aug. 12
Hume-Aleutian Packing Co., Karluk, Kadiak Island	2,600	49,623	11.9	June 16	Sept. 20	....	....	....	....
Karluk Packing Co., Karluk, Kadiak Island	2,600	54,777	11.9	June 3	Oct. 9	....	....	....	....
Alaska Improvement Co., Karluk, Kadiak Island	1,500	49,852	11.9	June 12	Sept. 21	....	....	....	....
Arctic Packing Co., Alitak Bay, Kadiak Island	1,500	37,401	13.7	June 9	Aug. 29	....	....	....	....
Pacific Steam Whaling Co., Uyak Anchorage, Kadiak Island.	800	17,000	12	July 3	Sept. 15	....	....	....	....
Hume Bros. & Hume, Uyak Anchorage, Kadiak Island	800	13,375	12.7	June 14	Sept. 15	....	....	....	....
Uganuk Fishing Station, Uganuk Bay, Kadiak Island	1,400	2,113	10	June 10	July 13	....	....	....	....
Chignik Bay Co., Chignik Lagoon, Chignik Bay	2,600	36,834	12.4	June 8	Aug. 27	942	11	Aug. 1	Aug. 27
Hume Bros. & Hume, Anchorage Bay, Chignik Bay	800	12,000	12	June 12	Aug. 12	....	....	....	....
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	800	23,500	12	June 9	Aug. 15	....	....	....	....
Arctic Packing Co., Nushagak River	2,000	88,791	14	June 23	July 20	10,119	....	Aug. 1	Aug. 7
Alaska Packing Co., Nushagak River	2,000								
Bristol Bay Canning Co., Nushagak River	2,000								
Point Roberts Packing Co., Kvichak River, Bering Sea	2,000	55,382	12.4	June 23	July 20	....	....	....	....
Arctic Packing Co., Naknek River, Bering Sea	1,800	34,496	12.4	....	....	....	....	....	....
Naknek Packing Co., Naknek River, Bering Sea	1,500	18,000	12	June 30	Aug. 1	....	....	....	....
Ugashik Fishing Station, Ugashik River, Bering Sea	1,800	38,261	12	....	....	....	....	....	....
		688,561				43,557			

Name of company and location of cannery.	Humpbacks.				King and dog salmon.				
	Number of cases packed.	Average number per case.	Commenced packing.	Finished packing.	Number of cases packed.		Average number per case.	Commenced packing.	Finished packing.
Quadra Packing Co., Mink Bay, Boca de Quadra	14,000	....			....		....		
Metlakahtla Industrial Co., Metlakahtla, Annette Island	7,260	....	July 20	Aug. 26		[1]300	....	Scattering through season.	
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island.	15,926	19	July 6	Aug. 31	....		....	....	....
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	49,264	23	July 9	Aug. 28	....		....	....	....
Boston Fishing and Trading Co., Yes or McDonald Bay	12,806	15	July 12	Sept. 6	Dog,	1,096	6	July 17	Aug. 7
Glacier Packing Co., Point Highfield, Wrangell Island	28,624	23.1	July 12	Aug. 18	King,	1,246	3.9	May 15	June 25
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island.	4,190	22	July 26	Aug. 22	....		....	....	....
Baranoff Packing Co., Redfish Bay, Baranof Island	8,436	23	July 19	Sept. 1	....		....	....	....
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet.	....	....	....	....	King,	4,727	3.1	May 28	June 28
Pacific Packing Co., Odiak, Prince William Sound	9,784	24.5	July 5	Aug. 8	King,	202	4.8	May 6	June 13
Pacific Steam Whaling Co., Orca, Prince William Sound	3,415	18.7	July 9	Aug. 5	....		....	....	....
Arctic Fishing Co., Kussilof River, Cook Inlet	....	....	....	....	King,	5,518	2.5	May 26	July 27
Chignik Bay Co., Chignik Lagoon, Chignik Bay	[2]383	15	July 31	Aug. 25	....		....	....	....
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	500	20	July 20	Aug. 15	....		....	....	....
Alaska Packing Co., Nushagak River, Bering Sea	3,123	....	Scattering through season.		King,	5,823	3	June 7	June 23
Point Roberts Packing Co., Kvichak River, Bering Sea	....	....	....	....	King,	126	2.7	June 7	June 23
Arctic Packing Co., Naknek River, Bering Sea	....	....	....	....	King,	180	....	....	....
Ugashik Fishing Station, Ugashik River, Bering Sea	....	....	....	....	King,	11	....	....	....
	157,711					[3]19,229			

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[1] Do-overs.

[2] Humpback and dog salmon.

[3] Includes dog salmon.

Table showing the value of plants, the employees, and fishing apparatus of the Alaska salmon canneries for 1896.

Name of company and location of cannery.	Value of plant.	Fishermen.		Other employees.		
		White.	Native.	White.	Native.	Chinese.
Quadra Packing Co., Mink Bay, Boca de Quadra	(?)	....	....	....	....	....
Metlakahtla Industrial Co., Metlakahtla, Port Chester, Annette Island	$33,356	....	72	....	[2] 163	....
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island	40,000	8	45	6	6	58
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	73,000	50	75	6	[2] 15 to 20	130
Boston Fishing and Trading Co., Yes or McDonald Bay	40,000	15	20	3	[3] 10	50
Glacier Packing Co., Point Highfield, Wrangell Island	45,000	20	70	8	[3] 4	80
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island	20,000	2	40	7	[3] 32 [4] 30	2
Baranoff Packing Co., Redfish Bay, Baranof Island	12,000	....	17	3	....	31
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet	[1] 113,000	60	200	14	....	87
Peninsula Trading and Fishing Co., Coquenhena, Copper River Delta	40,000	40	....	20	....	60
Pacific Packing Co., Odiak, Prince William Sound	51,000	64	....	7	....	66
Pacific Steam Whaling Co., Orca, Prince William Sound	60,000	60	....	25	....	65
Arctic Fishing Co., Kussilof River, Cook Inlet	[1] 108,000	35	....	8	20	100
Hume-Aleutian Packing Co., Karluk, Kadiak Island Karluk Packing Co., Karluk, Kadiak Island	[1] 600,000	....	....	[5] 200	[5] 100	200
Alaska Improvement Co., Karluk, Kadiak Island	38,000	60	18	16	....	122
Arctic Packing Co., Alitak Bay, Kadiak Island	[1] 106,000	25	....	7	10	57
Uganuk Fishing Station, Uganuk Bay, Kadiak Island	50,000	20	....	12	16	70
Chignik Bay Co., Chignik Lagoon, Chignik Bay, Alaska Peninsula	[1] 225,000	73	....	[6] 16	33	158
Hume Bros. & Hume, Anchorage Bay, Chignik Bay	30,000	40	....	20	....	90
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	40,000	30	....	15	....	58

Name of company.	Gill nets and traps—number, dimensions, and value.	Seines—number, dimensions, and value.
Quadra Packing Co	....	(No data.)
Metlakahtla Industrial Co	....	9 drag seines, 100 fathoms long; $200 each. 2 purse seines, 120 fms. long; $350 each.
Pacific Steam Whaling Co., Hunter Bay.	....	9 drag seines, average 75 fms. long; $1.25 per fm. 1 purse seine, 175 fms. long, 12 fms. deep; $522. 1 purse seine, 175 fms. long, 7 fms. deep; $300.
Alaska Salmon Packing and Fur Co	....	21 drag seines, 75 to 250 fms. long; $1.50 per fm.
Boston Fishing and Trading Co	....	4 drag seines, 80 to 140 fms., 3-inch mesh; $1.50 per fm. 1 purse seine, 220 fms. by 30 fms., 3-inch mesh; $800.
Glacier Packing Co	14 gill nets, 250 fms., 8½-inch mesh, 24 meshes deep; 40 cents per fm. 14 gill nets, 200 fms., 6¼-inch mesh, 20 meshes deep; 40 cents per fm.	9 drag seines, 50 to 150 fms. long by 3 to 8 fms. deep; $1.50 per fm.
North Pacific Trading and Packing Co.	1 experimental trap; $1,000	4 drag seines, 110 fms. long; $1.50 per fm.
Baranoff Packing Co	....	2 drag seines, 125 fms. long; $1.50 per fm.
Pyramid Harbor Packing Co	12 gill nets, 200 fms. by 16 feet, 8½-inch mesh; 65 cents per fm. 46 gill nets, 300 fms. by 10 feet, 6¼-inch mesh; 65 cents per fm.	
Peninsula Trading and Fishing Co.	10 gill nets, 100 fms., 24 meshes deep; $1 per fm 20 gill nets, 200 fms., 30 meshes deep; $1 per fm	
Pacific Packing Co	32 sets gill nets, 450 fms. per set. Mesh, 6¼-inch for red; 6¼-inch for coho; 9¼-inch for king; $1 per fm.	2 drag seines, 150 fms., 3-inch mesh, 120 meshes deep; $1 per fm.
Pacific Steam Whaling Co., Orca	30 sets gill nets, 350 fms. per set. Mesh, 6¼-inch for red; 6¼-inch for coho; 9¼-inch for king; $1 per fm.	3 drag seines, 150 fms. long; $1 per fm.
Arctic Fishing Co	15 gill nets, 50 fms. long, 6¼-inch mesh, 30 meshes deep; $1 per fm. 15 gill nets, 50 fms. long, 9¼-inch mesh, 22 meshes deep; $1 per fm. 8 traps, 30 to 50 foot pots; 300 to 700 foot leaders; $300 to $1,500 each.	
Hume-Aleutian Packing Co Karluk Packing Co	....	8 drag seines, 450 fms., 3-inch mesh, 145 meshes deep; $1.50 per fm. 2 drag seines, 425 fms., 3-inch mesh, 180 meshes deep; $1.50 per fm. 1 drag seine, 200 fms., 3-inch mesh, 100 meshes deep; $1.50 per fm.
Alaska Improvement Co	1 floating trap at Uganuk; leader 200 fms., pot 36 ft. by 200 ft., 3¼-inch mesh; $1,500.	3 drag seines, 500 fms., 3¼-inch mesh; $1.75 per fm. 3 drag seines, 375, 175, and 150 fms.; $1.75 per fm.
Arctic Packing Co., Alitak Bay	....	2 drag seines, 250 fms. deep by 120 m., 3-inch mesh; $1 per fm. 2 drag seines, 200 fms. deep by 100 m., 3-inch mesh; $1 per fm. 1 drag seine, 100 fms. deep by 80 m., 3 inch mesh; $1 per fm.
Uganuk Fishing Station	1 trap fence; $800	2 drag seines, 350 fms., 3-inch mesh, 125 meshes deep, $1.50 per fm.
Chignik Bay Co	3 gill nets, 150 fms., 6¼-inch mesh; 65 cents per fm. 9 traps, leaders average 1,350 feet; $1,000 each.	5 drag seines, 200 fms. long., 3-inch mesh, 100 meshes deep; $1.50 per fm.
Hume Bros. & Hume, Anchorage Bay.	10 gill nets, 200 fms., 6¼-inch mesh, 40 meshes deep; 75 cents per fm. 3 traps, leaders 150 to 200 fms; $1,200 each	1 drag seine, 250 fms. long, 3-inch mesh; $1.50 per fm. 1 drag seine, 200 fms. long, 3-inch mesh; $1.50 per fm. 1 drag seine, 100 fms. long, 3-inch mesh; $1.50 per fm.
Pacific Steam Whaling Co., Anchorage Bay.	5 traps, 150 to 200 fm. leaders; 40-feet square pots; $1,100 each.	2 drag seines, 250 fms. long, 3-inch mesh; $1.50 per fm.

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[1] Includes the values of cannery plants in reserve in the district.
[2] During busy season.
[3] Women.
[4] Men and boys.
[5] Includes fishermen.
[6] Includes 3 coal miners.

Table showing the vessels and boats employed by the Alaska salmon canneries in 1896.

Name of company.	Steam vessels.				Sail vessels.				
	Name.	Net tons.	Value.	Crew.	Name.	Rig.	Net tons.	Value.	Crew.
Metlakahtla Industrial Co	Marie G. Haaven	13	$3,000	5	(Transport by regular line of steamers.)				
Pacific Steam Whaling Co., Hunter Bay.	Alice Minnie M. (launch)	20 3	10,000 400	5 2	(Transport by calling vessel of company.)				
Alaska Salmon Packing and Fur Co.	Novelty Arctic	34 21	13,000 12,000	5 5	Electra	Bark	940	$12,000	Fishermen.
Boston Fishing and Trading Co.	Rosie (launch) (Charter extra during busy season.)	5	2,000	2	(Transport by regular line of steamers.)				
Glacier Packing Co	Ella Rohlffs Puritan	37 14	14,000 10,500	5 5	Geo. Skolfield.	Ship	1,276	10,000	Fishermen.
North Pacific Trading and Packing Co.	Klawack Cora (launch)	11	5,000 1,000	4 3	(Transport by chartered vessel.)				
Baranoff Packing Co	Wigwam	24	10,000	5	(Transport by chartered vessel.)				
Pyramid Harbor Packing Co	Elsie Lillian	38 20	15,000 8,800	5 4	Invincible	Ship	1,394	Chartered	Fishermen.
Peninsula Trading and Fishing Co.	Thlinket (st. wheel) Beaver (launch)	50 5	10,000 4,000	5 3	(Transport by vessel from Orca.)				
Pacific Packing Co	Pacific S. B. Matthews (st. wh.) Susanna (stern-wheel)	32 165 18	14,000 14,000 9,000	6 6 6	Gatherer	Bark	1,377	Chartered	....
Pacific Steam Whaling Co., Orca.	Wildcat (stern-wheel)	50	10,000	5	America	Ship	1,909	Chartered	Fishermen.
Arctic Fishing Co.	Jennie Olga Arthur (launch)	70 8 5	26,000 6,000 2,100	7 2 2	Prussia	Bark	1,131	Chartered	Fishermen.
Hume-Aleutian Packing Co Karluk Packing Co	Hattie Gage 2 launches	42 5 (each)	17,000 2,000 (each)	8 2 (each)	Santa Clara St. Nicholas	Ship Ship	1,473 1,688	30,000 Chartered	18 19
Alaska Improvement Co	Kadiak Alaska Delphine } Launches Corinne } Launches	58 23 5 5	23,000 7,500 4,500 3,750	8 5 2 2	Centennial Harvester Premier	Ship Bark 3-m. sch.	1,139 716 292	14,250 7,750 9,000	14 10 8
Arctic Packing Co., Alitak Bay.	Aleut	19	10,000	4	Coryphene	Bark	771	Chartered	....
Uganuk Fishing Station	(Station tended by steamer from Karluk.)				(Transport by vessels from Karluk.)				
Chignik Bay Co	Afognak Baby Ruth (st. wheel)	38 10	15,750 4,500	9 3	Llewellyn J. Morse.	Ship	1,271	25,000	Fishermen.
Hume Bros. & Hume, Anchorage Bay.	Florence Hume	8	3,000	2	Leon Equator	Bark Schr	 69	7,000 6,000	12 6
Pacific Steam Whaling Co., Anchorage Bay.	Salmo	35	7,000	4	(Transport by calling vessel of company.)				

Name of company.	Lighters, etc.		Boats.	
	Number and description.	Value.	Number and description.	Value.
Metlakahtla Industrial Co.	2 lighters	$150 each	7 Columbia-river boats 10 skiffs	$180 each. $30 each.
Pacific Steam Whaling Co., Hunter Bay	3 lighters 2 purse-seine scows 2 pile drivers	$100 each $150 each $750 each	2 whale boats 5 seine boats	$85 each. $50 each.
Alaska Salmon Packing and Fur Co.	29 lighters and scows	$50 to $100 each.	21 seine boats	$70 each.
Boston Fishing and Trading Co	6 lighters	$50 to $75 each	4 seine boats	$50 to $75 each.
Glacier Packing Co	2 lighters 1 1	$50 $400	14 Columbia-river boats 20 dories and skiffs	$180 each. $25 each.
North Pacific Trading and Packing Co	1 fish scow	$100	4 seine boats	$90 each.
Baranoff Packing Co	....	....	4 seine boats	$75 each.
Pyramid Harbor Packing Co	4 lighters	$50 each	48 Columbia-river boats Several skiffs	$200 each. $20 each.
Peninsula Trading and Fishing Co	2 lighters	$200 each	29 Columbia-river boats	$200 each.
Pacific Packing Co	1 lighter	$250	32 Columbia-river boats 2 seine boats	$200 each. $100 each.
Pacific Steam Whaling Co., Orca	2 lighters	$250 each	30 Columbia-river boats 3 seine boats	$200 each. $100 each.
Arctic Fishing Co	3 sloop lighters 1 coal scow 1 pile driver	$400 each $500 $750	15 gill-net boats 6 trap scows	$50 each. $50 each.
Hume-Aleutian Packing Co Karluk Packing Co	13 lighters	$400 each	15 seine boats 70 dories	$125 each. $25 each.
Alaska Improvement Co	....	....	7 beach seine boats, 35 feet. 2 river seine boats, 25 feet. 1 river seine boat, 20 feet Many dories and skiffs	$4 per linear foot. $4 per linear foot. $4 per linear foot. $25 each.
Arctic Packing Co., Alitak Bay	3 lighters 4 scows	$250 each $100 each	4 seine boats 10 dories	$150 each. $20 each.
Uganuk Fishing Station	8 lighters	$200 each	7 scows 10 dories	$60 each. $20 each.
Chignik Bay Co	7 lighters 10 trap scows 2 pile drivers	$350 each $200 each $650 each	12 seine and gill-net boats.	$125 each.
Hume Bros. & Hume, Anchorage Bay	4 lighters 4 trap scows 1 sail scow	$350 each $100 each $500	10 gill-net boats 8 boats and skiffs	$200 each. $25 each.
Pacific Steam Whaling Co., Anchorage Bay	11 lighters and scows 1 pile driver	$50 to $250 each $650	4 seine boats Several skiffs	$60 each. $20 each.

Table showing the value of plants, the employees, and fishing apparatus of the Alaska salmon canneries for 1897.

Name of company and location of cannery.	Value of plant.	Fishermen.		Other employees.		
		White.	Native.	White.	Native.	Chinese
Quadra Packing Co., Mink Bay, Boca de Quadra	....	20	20	8	....	50
Metlakahtla Industrial Co., Metlakahtla, Port Chester, Annette Island	$23,356	....	72	....	[1] 162	....
Pacific Steam Whaling Co., Hunter Bay, Prince of Wales Island	40,000	35	45	6	6	58
Alaska Salmon Packing and Fur Co., Loring, Naha Bay	73,000	20	175	7	[2] 25	130
Boston Fishing and Trading Co., Yes or McDonald Bay	40,000	15	20	3	[2] 10	50
Glacier Packing Co., Point Highfield, Wrangell Island	45,000	20	70	8	[2] 4	80
North Pacific Trading and Packing Co., Klawak, Prince of Wales Island	20,000	2	40	8	[3] 62	7
Baranoff Packing Co., Redfish Bay, Baranof Island	12,000	....	17	3	....	31
Pyramid Harbor Packing Co., Pyramid Harbor, Chilkat Inlet	[4] 118,000	90	300	14	....	87
Pacific Packing Co., Odiak, Prince William Sound	51,000	64	....	7	....	66
Pacific Steam Whaling Co., Orca, Prince William Sound	60,000	86	....	17	6	81
Arctic Fishing Co., Kussilof River, Cook Inlet	[4] 106,000	35	....	8	20	100
Hume-Aleutian Packing Co., Karluk, Kadiak Island Karluk Packing Co., Karluk, Kadiak Island Alaska Improvement Co., Karluk, Kadiak Island	[4] 858,507	126	....	[5] 65	25	390
Uganuk Fishing Station, Uganuk Bay, Kadiak Island	([6])	[6] 20	....	[6] 12	....	[6] 96
Arctic Packing Co., Alitak Bay, Kadiak Island	[4] 106,000	25	....	7	10	57
Pacific Steam Whaling Co., Uyak Anchorage, Kadiak Island	40,000	40	....	20	....	60
Hume Bros. & Hume, Uyak Anchorage, Kadiak Island	30,000	75	....	32	....	60
Chignik Bay Co., Chignik Lagoon, Chignik Bay, Alaska Peninsula	[4] 225,000	57	....	[7] 16	....	103
Hume Bros. & Hume, Anchorage Bay, Chignik Bay	30,000	55	....	10	....	65
Pacific Steam Whaling Co., Anchorage Bay, Chignik Bay	40,000	60	....	15	....	58
Arctic Packing Co., Nushagak River, Bering Sea Alaska Packing Co., Nushagak River, Bering Sea Bristol Bay Canning Co., Nushagak River, Bering Sea	[4] 386,500	144	....	38	40	306
Point Roberts Packing Co., Kvichak River, Bering Sea	53,000	65	....	10	25	150
Arctic Packing Co., Naknek River, Bering Sea	61,000	45	....	10	10	102
Naknek Packing Co., Naknek River, Bering Sea	....	40	....	10	10	75
Ugashik Fishing Station, Ugashik River, Bering Sea	87,500	50	....	9	24	102

Name of company.	Gill nets and traps—number, dimensions, and value.	Seines—number, dimensions, and value.
Quadra Packing Co, Mink Bay	....	14 drag and purse seines (no data).
Metlakahtla Industrial Co	10 gill nets 180 fathoms long, 4 fms. deep, 5½-inch and 6-inch mesh; $150 each.	9 drag, 100 fms. long; $200 each. 2 purse, 120 fms. long; $350 each.
Pacific Steam Whaling Co., Hunter Bay.	....	12 drag, 75 fms. long; $1.25 per fm. 1 purse, 175 fms. long, 12 fms. deep; $522. 1 purse, 175 fms. long, 7 fms. deep; $300.
Alaska Salmon Packing and Fur Co.	....	21 drag, 75 to 250 fms. long; $1.50 per fm.
Boston Fishing and Trading Co.	....	4 drag, 80 to 140 fms. long, 3-inch mesh; $1.50 per fm. 1 purse, 220 by 30 fms., 3-inch mesh; $800.
Glacier Packing Co	12 gill nets, 250 fms. by 24 m., 8½-in.; 40 cents per fm. 12 gill nets, 200 fms. by 26 m., 6½-in.; 40 cents per fm.	9 drag, 50 to 150 fms. long, 3 to 8 fms. deep; $1.50 per fm.
North Pacific Trading and Packing Co.	1 experimental trap; $1,000	4 drag, 110 fms. long; $1.50 per fm.
Baranoff Packing Co	....	2 drag, 125 fms. long; $1.50 per fm.
Pyramid Harbor Packing Co	12 gill nets, 200 fms. long, 16 feet deep, 8½-inch mesh; 65 cents per fm. 46 gill nets, 300 fms. long, 10 feet deep, 6½-inch mesh; 65 cents per fm.	
Pacific Packing Co	32 gill nets, sets, 450 fms. per set; mesh 6½-inch, red; 6½-inch, coho; 9½-inch, king; $1 per fm.	2 drag, 150 fms., 3-inch mesh, 120 m. deep; $1 per fm.
Pacific Steam Whaling Co., Orca	43 gill nets, sets, 450 fms. per set; mesh 6½-inch, red; 6½-inch, coho; 9½-inch, king; $1 per fm.	4 drag, 150 fms.; $1 per fm.
Arctic Fishing Co	15 gill nets, 50 fms. long, 30 m. deep, 6½-in.; $1 per fm. 15 gill nets, 50 fms. long, 22 m. deep, 9½-in.; $1 per fm. 8 traps, 30 to 50 foot pots, 300 to 700 foot leaders; $300 to $1,500 each.	
Hume-Aleutian Packing Co Karluk Packing Co Alaska Improvement Co	....	3 drag, 500 fms., 125 m. deep, 3-in. mesh; $1.50 per fm. 8 drag, 450 fms., 145 m. deep, 3-in. mesh; $1.50 per fm. 3 drag, 425 fms., 180 m. deep, 3-in. mesh; $1.50 per fm. 3 drag, 200 fms., 100 m. deep, 3-in. m.; $1.50 per fm.
Uganuk Fishing Station	1 floating trap, 200-fm. lead, 100-fm. wings; $1,500 1 floating trap, 300-fm. lead, 100-fm. wings; $1,500	2 drag, 350 fms. long, 125 m. deep, 3-in. mesh; $1.50 per fm.
Arctic Packing Co., Alitak Bay	....	2 drag, 250 fms. long, 120 m. deep, 3-in. mesh; $1 per fm. 2 drag, 200 fms. long, 100 m. deep, 3-in. mesh; $1 per fm. 1 drag, 100 fms. long, 80 m. deep, 3-in. mesh; $1 per fm.
Pacific Steam Whaling Co., Uyak Anchorage.	....	2 drag, 300 fms. long, 3 inch mesh; $1.50 per fm. 2 drag, 150 fms. long, 3-inch mesh; $1.50 per fm. 2 drag, 100 fms. long, 3-inch mesh; $1.50 per fm. 1 purse, 300 fms. long; $1,000.
Hume Bros. & Hume, Uyak Anchorage.	3 gill nets, 200 fms. long, 30 meshes deep, 6-inch mesh; 65 cents per fm.	6 drag, 200 to 300 fms. long, 100 to 125 m. deep; $1.75 per fm.
Chignik Bay Co	3 gill nets, 150 fms. long, 6½-in. mesh; 65 cts. per fm. 10 traps, average 1,350 feet long; $1,000 each	5 drag, 200 fms., 100 m. deep, 3-inch mesh; $1.50 per fm.
Hume Bros. & Hume, Anchorage Bay.	10 gill nets, 200 fms. long, 6½-inch mesh, 40 meshes deep; 75 cents per fm. 5 traps, leaders 150 to 200 fms.; $1,200 each	1 drag, 250 fms. long, 3-inch mesh; $1.50 per fm. 1 drag, 200 fms. long, 3-inch mesh; $1.50 per fm. 1 drag, 100 fms. long, 3-inch mesh; $1.50 per fm.
Pacific Steam Whaling Co., Anchorage Bay.	8 traps, 150 to 200 fm. leaders, 40-foot square pots; $1,100 each.	2 drag, 250 fms. long, 3-inch mesh; $1.50 per fm.
Arctic Pack'g Co., Nushagak R. Alaska Packing Co Bristol Bay Canning Co	60 gill nets, 125 fms. long, 24 m. deep; 75 cts. per fm. 120 gill nets, 75 fms. long, 24 m. deep; 75 cts. per fm. 4 traps; leaders, 300 feet average; $1,000 each.	
Point Roberts Packing Co	25 gill nets, 60 fms. long, 30 m. deep; 75 cts. per fm. 4 traps, leaders 300 feet; $1,000 each.	
Arctic Packing Co., Naknek River.	11 gill nets, 70 fms. long, 24 m. deep; 75 cts. per fm. 34 gill nets, 70 fms. long, 22 m. deep; 75 cts. per fm. 3 traps, leaders 175 feet; $750 each.	
Naknek Packing Co	30 gill nets, 100 fms. long, 20 m. deep; 40 cts. per fm. 1 double trap; $600	2 drag seines, 60 fms. long (to empty trap); $1.25 per fm.
Ugashik Fishing Station	21 gill nets, 75 fms. long, 24 m. deep; 75 cts. per fm. 2 traps, 150 and 250 foot leaders; $600 each.	

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[1] During busy time.

[2] Women.

[3] 32 women, 30 men and boys.

[4] Includes values of cannery plants in reserve.

[5] Includes 16 hatcherymen.

[6] Included in Karluk figures.

[7] Includes 3 coal miners.

Table showing the vessels and boats employed by the Alaska salmon canneries in 1897.

Name of company.	Steam vessels.				Sail vessels.				
	Name.	Net tons.	Value.	Crew.	Name.	Rig.	Net Tons.	Value.	Crew.
Quadra Packing Co	Annie M. Nixon	18	$6,000	5	(No data.)				
Metlakahtla Industrial Co.	Herald	19	7,000	5	(Transport by regular line of steamers.)				
	Marie G. Heaven	13	3,000	5					
Pacific Steam Whaling Co., Hunter Bay.	Alice	20	10,000	5	(Transport by calling vessel of company.)				
	Columbia	70	Chart.	9					
	Minnie M. (launch)	3	400	2					
Alaska Salmon Packing and Fur Co.	Novelty	34	12,000	5	Nicholas Thayer (2 trips)	Bark.	556	$10,000	Fishermen.
	Arctic	21	12,000	5	Electra	Bark.	940	12,000	Fishermen.
Boston Fishing and Trading Co.	Alaska	38	Chart.	5	(Transport by regular line of steamers.)				
	Rosie (launch)	5	2,000	2					
Glacier Packing Co	Puritan	14	10,500	5	Geo. Skolfield	Ship.	1,276	16,000	Fishermen.
	Ella Rohlffs	37	14,000	5					
North Pacific Trading and Packing Co.	Klawack	11	5,000	4	(Transport by chartered vessel.)				
	Cora (launch)		1,000	3					
Baranoff Packing Co	Wigwam	24	10,000	5	(Transport by chartered vessel.)				
Pyramid Harbor Packing Co.	Elsie	38	16,000	5	Invincible	Ship.	1,394	Chart.	Fishermen.
	Lillian	20	8,800	4					
Pacific Packing Co	Pacific	32	14,000	6	Centennial	Ship.	1,139	20,000	Fishermen.
	S. B. Matthews (st. wh.)	165	14,000	6					
	Susanna (stern-wheel)	18	9,000	6					
Pacific Steam Whaling Co., Orca.	Wolcott	199	25,000	9	America	Ship.	1,909	Chart.	Fishermen.
	Wildcat (stern-wheel)	50	10,000	5					
	Thlinket (stern-wheel)	50	10,000	5					
Arctic Fishing Co	Jennie	70	26,000	6	Prussia	Bark.	1,131	Chart.	Fishermen.
	Olga	8	6,000	2					
	Arthur (launch)	5	2,100	2					
Hume-Aleutian Pkg. Co. Karluk Packing Co Alaska Improvement Co	Hattie Gage	42	17,000	8	Santa Clara (2 trips)	Ship.	1,473	30,000	18
	Kadiak	58	20,250	8	St. Nicholas	Ship.	1,688	Chart.	19
	Aurora (launch)	5	3,700	2	Nicholas Thayer (2 trips to Loring).	Bark.	556	10,000	11
	Ida (launch)	5	2,700	2	Merom (1 trip to Naknek)	...do.	1,150	16,000	15
	Delphine (launch)	5	2,500	2					
	Julia M. (launch)	5	2,000	2					
Uganuk Fishing Station	(Station tended by steamer from Karluk.)				(Transportation by vessels from Karluk.)				
Arctic Packing Co., Alitak Bay.	Aleut	19	10,000	4	Kate Davenport	Bark.	1,175	Chart.	Fishermen.
Pacific Steam Whaling Co., Uyak Anchorage.	Golden Gate	50	20,000	5	(Transport by calling vessel of company.)				
	Beaver (launch)	5	4,000	2					
Hume Bros. & Hume, Uyak Anchorage.	Equator	40	10,000	7	Harvester	Bark.	716	7,500	12
Chignik Bay Co	Afognak	38	15,750	9	Llewellyn J. Morse	Ship.	1,271	25,000	Fishermen.
	Baby Ruth (stern-wheel)	10	4,500	3					
Hume Bros. & Hume, Anchorage Bay.	Florence Hume	8	3,000	2	Ferris S. Thompson	Bark.	514	7,500	11
Pacific Steam Whaling Co., Anchorage Bay.	Salmo	35	7,000	4	(Transport by calling vessel of company.)				
Arctic Packing Co., Nushagak River. Alaska Packing Co Bristol Bay Canning Co.	Polar Bear	29	12,000	5	Sterling	Ship.	1,637	30,000	Fishermen.
	Tyone (launch)	5	4,500	2	Eclipse	Ship.	1,535	Chart.	Fishermen.
	Amy S. (launch)	5	3,000	2	Willie R. Hume	Barkentine	632	Chart.	Do.
	Corinne (launch)	5	1,500	2					
Point Roberts Pack'g Co	President	238	49,000	8	Bohemia	Ship.	1,529	30,000	Do.
	Northern Light (launch)	5	3,000	2	W. W. Case	Bark.	556	10,000	Fishermen.
	J. W. Clark (launch)	5	2,000	2					
Arctic Packing Co., Naknek River.	Ralph L. (launch)	5	4,500	2	Merom	Bark.	1,150	16,000	Do.
					Prosper	Sch'r.	230	15,000	Do.
Naknek Packing Co	Emelia (launch)	5	1,200	2	B. P. Cheney	Bark.	1,200	14,000	Do.
Ugashik Fishing Station.	Thistle	55	25,000	6	Coryphene	Bark.	771	Chart.	Do.
	Cathie K (launch)	5	2,500	2					

Name of company.	Lighters, etc.		Boats.	
	Number and description.	Value.	Number and description.	Value.
Quadra Packing Co	1 pile driver	$500	12 lighters and boats	$50 each.
Metlakahtla Industrial Co	2 lighters	$150 each	7 Columbia-river boats 10 skiffs	$180 each. $30 each.
Pacific Steam Whaling Co., Hunter Bay	3 lighters 2 purse-seine scows 2 pile drivers	$100 each $150 each $750 each	2 whaleboats 5 skiffs	$65 each. $25 each.
Alaska Salmon Packing and Fur Co	29 fish scows	$50 to $100 each	21 seine boats	$50 each.
Boston Fishing and Trading Co	6 lighters	$50 to $75 each	4 seine boats 14 Columbia-river boats	$50 to 75 each. $180 each.
Glacier Packing Co	1 large lighter 1 lighter	$400 $50	20 dories and skiffs 4 seine boats	$25 each. $60 each.
North Pacific Trading and Packing Co	1 fish scow	$100	4 seine boats	$75 each.
Baranoff Packing Co				
Pyramid Harbor Packing Co	4 lighters	$50 each	48 Columbia-river boats Several skiffs	$200 each. $20 each.
Pacific Packing Co	1 lighter	$250	32 Columbia-river boats 2 seine boats	$200 each. $100 each.
Pacific Steam Whaling Co., Orca	2 lighters	$250 each	43 Columbia-river boats 3 seine boats	$200 each. $100 each.
Arctic Fishing Co	3 sloop lighters 1 coal scow 1 pile driver	$400 each $500 $750	15 gill-net boats 6 trap scows	$50 each. $50 each.
Hume-Aleutian Packing Co Karluk Packing Co Alaska Improvement Co	13 lighters	$400 each	21 seine boats 113 dories	$125 each. $25 each.

Table showing the vessels and boats employed by the Alaska salmon canneries in 1897—Continued.

Name of company.	Lighters, etc.		Boats.	
	Number and description.	Value.	Number and description.	Value.
Uganuk Fishing Station	7 scows 8 lighters	$60 each $200 each	10 dories	$20 each.
Arctic Packing Co., Alitak Bay	3 lighters 4 scows	$250 each $100 each	4 seine boats 10 dories	$150 each. $20 each.
Pacific Steam Whaling Co., Uyak Anchorage	2 lighters	$350 each	5 seine boats 15 dories	$100 each. $25 each.
Hume Bros. & Hume, Uyak Anchorage	2 lighters	$350 each	12 seine boats	$100 each.
Chignik Bay Co	8 lighters 10 trap scows 3 pile drivers	$350 each $200 each $650 each	12 seine and gill-net boats	$125 each.
Hume Bros. & Hume, Anchorage Bay	4 lighters 4 trap scows 1 sail scow	$350 each $100 each $500	10 gill-net boats 8 boats and skiffs	$200 each. $25 each.
Pacific Steam Whaling Co., Anchorage Bay	11 lighters and scows 2 pile drivers	$50 to $250 each $650 each	4 seine boats Several skiffs	$60 each. $20 each.
Arctic Packing Co. Alaska Packing Co Bristol Bay Canning Co Nushagak River	(No data)		96 boats and lighters	(?)
Point Roberts Packing Co	(No data)		32 boats, lighters, and scows	(?)
Arctic Packing Co., Naknek River	(No data)		30 boats and lighters	(?)
Naknek Packing Co	1 lighter 6 lighters 1 pile driver	$700 $300 each $300	20 gill-net boats	$90 each.
Ugashik Fishing Station	(No data)		53 boats and lighters	(?)

SALTERY STATISTICS.

The following table shows the extent to which the salting of salmon was carried in Alaska in 1897, and comprises all the data obtainable, except that, in addition to the amounts given, various small establishments in southeast Alaska salted about 500 barrels. Reducing half-barrels to barrels, it will be seen that the total salt-salmon output for Alaska in 1897 was about 15,543 barrels.

Table giving the saltery statistics of Alaska for 1897.

Location.	Salteries.	Redfish (barrels).	Cohoes (barrels).	King (barrels).	Humpback bellies (half bbls.)
Fort Tongass, southeast Alaska	James Turk				50
Mink Arm, Boca de Quadra, southeast Alaska	Clark & Martin		50		700
Ketchikan, Tongass Narrows, southeast Alaska	do		50		800
Ward Cove, Tongass Narrows, southeast Alaska	Natives (Indians)				100
Hunter Bay, Prince of Wales Island, southeast Alaska	Alaska Packers' Association	[1]500			500
Nutqua Inlet, Prince of Wales Island, southeast Alaska	Pacific Steam Whaling Co	None salted; fish used at Pacific Steam Whaling Co.'s cannery.			
Sukkwan, Sukkwan Island, southeast Alaska	Banter & West				300
Kassook, Sukkwan Island, southeast Alaska	Miller & Co		200		700
Karta Bay, Prince of Wales Island, southeast Alaska	Baronovich Bros				41
Thorne Bay, Prince of Wales Island, southeast Alaska	Robert Bell		160		600
Yes (McDonald) Bay, southeast Alaska	Boston Fishing and Trading Co		150		
Whale Passage, Prince of Wales Island, southeast Alaska	Thomas McCauley				1,400
Lake Bay, Prince of Wales Island, southeast Alaska	do	Abandoned; tanks moved to Whale Passage. All fish supplied to Wrangell cannery.			
Salmon Bay, Prince of Wales Island, southeast Alaska	do				
Red Bay, Prince of Wales Island, southeast Alaska	do				
Shipley Bay, Prince of Wales Island, southeast Alaska	Walter Kosmikoff	Salted few for local use; sold fresh.			
Sar-kar, Prince of Wales Island, southeast Alaska	Fred. Brockman				300
Point Barrie, Kupreanof Island, southeast Alaska	Cyrus Orr	Salted few for local use; sold fresh.			
Point Ellis, Kuiu Island, southeast Alaska[1]	Jack Mantle	[2]Salted few for local use; sold fresh.			
Killisnoo, Chatham Strait, southeast Alaska[2]	Alaska Oil and Guano Co	[3]75	80	25	200
Port Althorp, southeast Alaska	Ford & Stokes	Reported abandoned.			
Nova Strait, southeast Alaska	Morrissey & Co	Abandoned.			
Sandy Bay, southeast Alaska	do	Abandoned.			
Tyonek, Cook Inlet	C. D. Ladd	[4]100			
Eagle Harbor, Kadiak Island	Eagle Harbor Packing Co	616			
Alitak Bay, Kadiak Island	Alaska Packers' Association	67			
Nushagak River, Bristol Bay, Bering Sea	do	178		32	
Do	C. E. Whitney & Co	2,436			
Koggiung, Kvichak River, Bristol Bay, Bering Sea	Alaska Packers' Association	1,480		220	
Naknek River, Bristol Bay, Bering Sea	Naknek Packing Co	600			
Egegak River, Bristol Bay, Bering Sea	Alaska Packers' Association	3,574		15	
Ugashik River, Bristol Bay, Bering Sea	do	128			
Do	C. A. Johnson	1,400			
Total		11,158	710	292	5,691

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[1] Redfish and coho mixed.
[2] A few half-barrels of redfish.
[3] Half-barrels. 950 half-barrels of herring were also salted.
[4] For local use.

STREAM AT M'DONALD BAY, LOOKING INTO SMALL LAKE.

MOUTH OF STREAM DRAINING LAKE NEAR MINK ARM, BOCA DE QUADRA

SOUTHEAST ALASKA DISTRICT.

EXTENT AND IMPORTANCE OF THE REGION.

This district extends from the southern boundary of Alaska to Cape Spencer. The trend of the mainland from the entrance to Portland Canal to the head of Lynn Canal is in a general northwest and southeast direction. The strip of territory west of the boundary line between Alaska and British Columbia is about 30 miles wide, and consists of irregular mountain masses often rising precipitously from the sea to an elevation of several thousand feet, and sometimes (as a point farther from the coast is reached) attaining an altitude of 9,000 to 10,000 feet. This rugged condition is broken on every hand by deep valleys or gorges through which the glaciers debouch and from which nearly all the streams on the mainland derive their sources. Fringing the mainland are numerous islands, large and small, close to the coast line, conforming to its irregularities, and separated from it and from each other by deep straits and channels. These islands, about 1,100 in number, extend from the coast an average distance of about 75 miles, and along the general contour for about 250 miles. As a rule they are mountainous and heavily wooded with spruce, hemlock, and cedar, forming an almost impenetrable growth. Some are very large, indented with deep bays and sounds, and they in turn are fringed with smaller islands.

Throughout this region numerous streams and streamlets on the islands and the mainland contain one or more species of salmon, but none alone can furnish sufficient salmon to supply a single cannery, and in only a few streams does the redfish, the principal salmon sought, exist in numbers sufficient for commercial purposes. As a result, each cannery is supplied from many streams, some of them, perhaps, 60 to 80 miles from the establishment. Encroachment of one cannery upon the streams claimed by another frequently occurs, and bad feeling, threats of violence, etc., occasionally result.

The largest salmon rivers in southeast Alaska are the Unuk, Stikine, Taku, and Chilkat, to which further reference will be made. These rivers take their source in the interior and drain considerable areas. The other rivers are usually small streams, and the greater number are simply outlets to a lake or system of lakes. These outlets are in some cases only half a mile in length, generally from 2 to 5 miles, and exceptionally 8 to 10 miles.

By reference to Chart A it will be seen that a line drawn through Sumner Straits and extending to the Stikine River forms a natural fishery division for southeast Alaska. South of this line are seven canneries, with an output in 1897 of 220,341 cases, and all the streams from which their supply is obtained except two small streams that furnish less than 5,000 redfish to the cannery at Wrangell. The division north of this line, though comprising a larger territorial area and coast line, has but two canneries, with an output of 51,526 cases in 1897, and if the Chilkat and Chilkoot rivers are excepted, there would not be sufficient redfish taken in all the streams of the upper division to pack 20,000 cases.

Since 1878 the district has packed 23.2 per cent of the total Alaska pack. In 1897 its percentage was 29.9.

BOCA DE QUADRA.

The *Albatross* arrived at Mary Island, southeast Alaska, June 6, and after making such inquiries relating to the salmon and halibut fisheries as seemed pertinent to the subject, went to the Boca de Quadra and anchored off the cannery the following day.

This body of water is a deep fiord making into the mainland in a general northeast direction from Revillagigedo Channel for a distance of 28 miles. Three smaller fiords branch from it to the southward and eastward, viz, Marten Arm, Mink Arm, and Vixen Bay; and extending to the northward are Badger Bay and Weasel Cove. There are no villages or permanent Indian habitations on the Boca de Quadra—a shack here and there affording temporary shelter during the hunting and fishing seasons. About 2 miles below the entrance on the southern side is a small Indian village named after the Cape Fox chief, Kah-Shakes, who lives there.

The shores are rugged and mountainous. A few streams, all of which contain salmon, discharge their waters into the main arm and into the heads of its branches. Only one, however, is known to be a resort of red salmon, though a second redfish stream empties into Kah-Shakes Cove.

One of the first canneries in Alaska was located on the northern shore of the Boca de Quadra, about 8 miles from the entrance. It was built in 1883 by Mr. M. J. Kinney, of Astoria, and was operated under the name of the Cape Fox Packing Company from 1883 to 1886. In the winter of 1886–87 it was sold and moved to a place now called Ketchikan, in Tongass Narrows, and was operated there under the name of the Tongass Packing Company during the seasons of 1887, 1888, and part of 1889. It was burnt in August, 1889, after having packed about 13,000 cases.

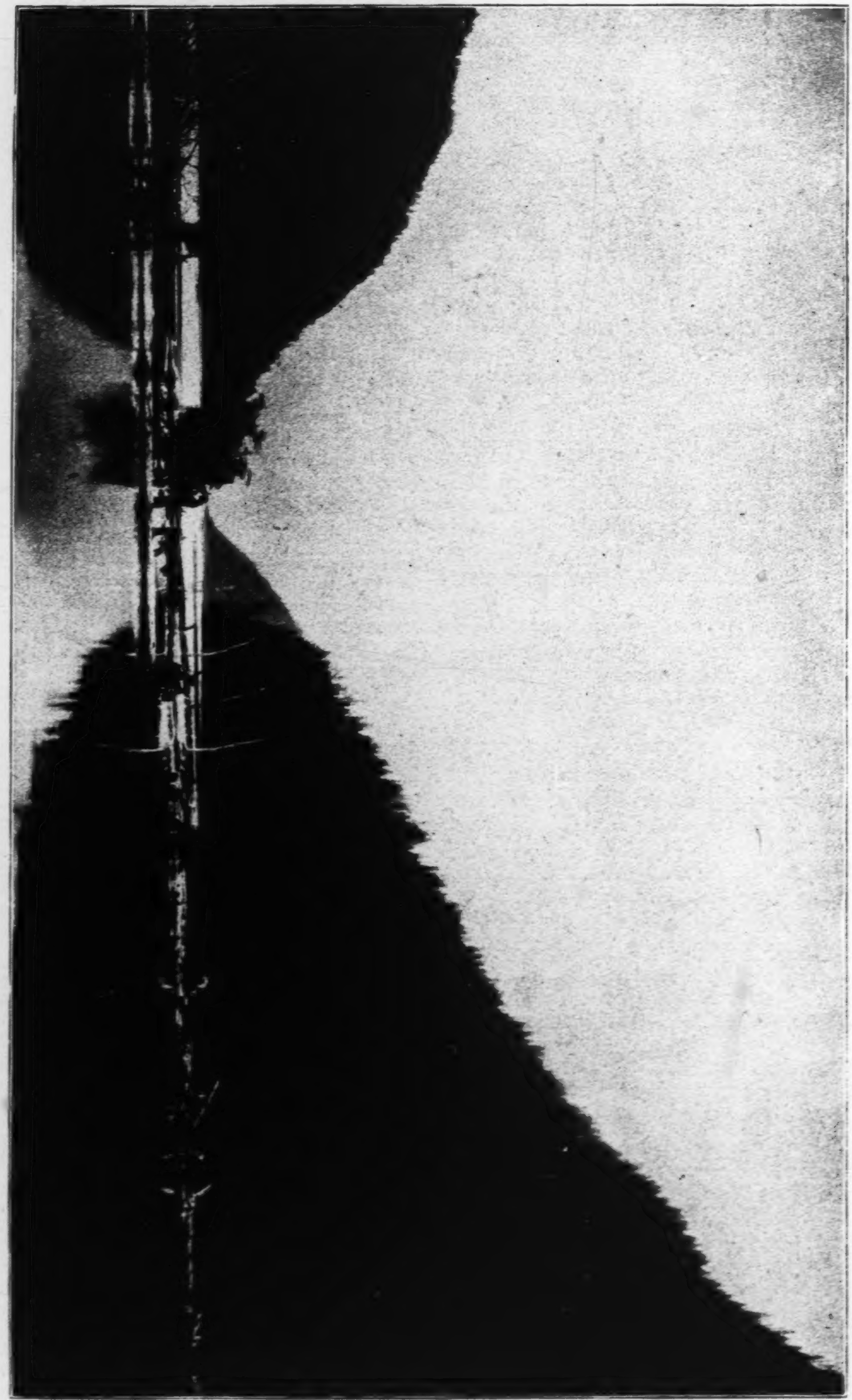
The cannery now operating in the Boca de Quadra was built by the Quadra Packing Company in the spring of 1896, and made its first pack that year. It is on the western shore of Mink Arm, in a small indentation near the entrance, and directly inside of Grouse Island. As the building was only commenced in March, the equipment was necessarily incomplete for the 1896 pack, yet 8,000 cases of redfish were canned. The fish were all taken at no great distance from the cannery, in purse seines. When the *Albatross* was at this point in the early part of the season, new buildings were being erected, the wharf extended, and preparations made for fishing on a more extended scale. For the season of 1897 the steam schooner *Annie M. Nixon* was chartered to transport fish from a distance and as a general cannery tender.

The agent of the company at Victoria reports that the total pack of 1897 was 24,500 cases, of which 7,500 cases were redfish, and the balance humpbacks and cohoes.

QUADRA STREAM AND LAKE.

The mouth of Quadra Stream is N. ½ W., a scant mile from the cannery, in a V-shaped inlet. The entrance is formed by precipitous rocky walls, covered with the dense growth characteristic of this country, and on approaching it the rushing white waters of the rapid stream are seen. The entrance contracts to a width of about 50 yards and then opens into a small bay. This bay receives the water of the stream at low water, but at high tide the fresh water recedes a considerable distance. A saltery was built on the northern shore about seven years ago by Clark & Martin, of Ketchikan. It was not operated in 1896, but some fish were salted in 1897.

After leaving this bay the rapid waters of the stream are encountered, and in less than half a mile the lake which is the source of the stream is found. The stream is



LAKE NEAR BOCA DE QUADRA.

about 20 yards wide, and from the lake to high water has possibly a fall of 30 feet. At the outlet of the lake the stream is heavily choked with drift, but this does not form a serious obstacle to the ingress of salmon.

Quadra Lake is about 4 miles long and from a half to three-fourths of a mile wide, and is surrounded by snow-capped mountains and precipitous shores. The dense, almost impenetrable, forest growth prevents any extended exploration from the shores, and, as the only navigable means at hand was a very crank and leaky canoe, only a cursory examination was made. The lake seems very deep and the water is discolored, probably from decomposed vegetation and the spongy conditions along the shores. It is fed by numerous cascades and falls, formed by the melting snows and the natural drainage, and it is said there is a sandy beach and an entering stream at the head.

It appears, from a superficial examination, that this would afford an excellent site for a hatchery. The small bay at the mouth of the stream could be made into a natural trap, with an abundance of room for all the fish, from which they could be easily removed when wanted, and plenty of water is obtainable by gravity, but it would probably have to be filtered.

Quadra Stream is at present considered one of the best red-salmon streams in southeast Alaska. 97,000 redfish in 1895 were taken from around its mouth and approaches; 137,000 were obtained in 1896, of which number the cannery at Loring secured 44,370 between July 13 and August 31, and Metlakahtla 13,780 from July 14 to August 22; and in 1897 about 65,000 fish were taken, of which 20,000 went to Loring, 4,000 to Metlakahtla, and the remainder to the Quadra cannery. The run of redfish at Quadra for cannery purposes usually lasts from July 15 to September 1. Straggling fish are taken before and after these dates. A few years ago this stream did not rank as a large producer of salmon. Until recently it was tightly barricaded every year. The competition for these salmon has probably caused overfishing by the introduction of more gear than the stream warrants.

In 1897 the locality was fished by the canneries at Loring, Metlakahtla, and Quadra, and the Mink Arm saltery. Fourteen seines, from 200 to 240 fathoms in length, were used, and Clark & Martin, of the saltery, used two purse seines, one 225 fathoms, the other 240 fathoms long. If fishing is continued as extensively as at present, it would seem that a large reduction in the catch must follow.

Judging this stream by others examined, and taking into consideration the probable overfishing, it is thought to have a capacity of 50,000 redfish under average conditions.

The Quadra redfish are the largest found in southeast Alaska, if not in all Alaska. They are well known to all the cannerymen in the vicinity, running 8 to the case, or averaging a trifle over 8 pounds in weight. Early in August they frequently lose their bright and firm appearance, their scales drop off, their fins become frayed, and they commence turning red in color. It is thought by some that these fish have been in fresh water, but such is probably not the case.

During a dry season, such as 1896, the salmon streams of southeast Alaska are so low that the fish can not ascend, but school around the mouths of the streams until the September rains raise the water, when they go up in a body. Fish so held and prevented from running, undoubtedly ripen in the brackish water at the river mouths as the spawning time approaches, and commence to disintegrate just as in fresh water, though not so rapidly.

OTHER STREAMS OF THE BOCA DE QUADRA REGION.

At the head of the main arm of the Boca de Quadra and of the arms making to the southward and eastward are streams having runs of cohoes and humpbacks, but no redfish. The stream at the head of Mink Arm was examined for a distance of about 2 miles. At the mouth it is about 60 feet wide, with an average depth of 6 inches, narrowing to 15 to 20 feet in a short distance. The stream is said to be a lake outlet, the lake lying some distance inland, but no one could be found who has ever visited it.

The stream at the head of Vixen Bay was also examined for a distance of 4 miles. It is from 75 to 100 feet wide at the mouth, narrowing to 50 feet. For the first mile the bottom is gravelly and well adapted for the spawning-grounds of humpback and dog salmon, but for the rest of the distance traveled it contains many bowlders. In the upper part reached by the party it is about 40 feet wide, with an average depth of 10 inches. The current is very strong.

It is said that a large number of cohoes are taken in Marten Arm.

KAH-SHAKES.

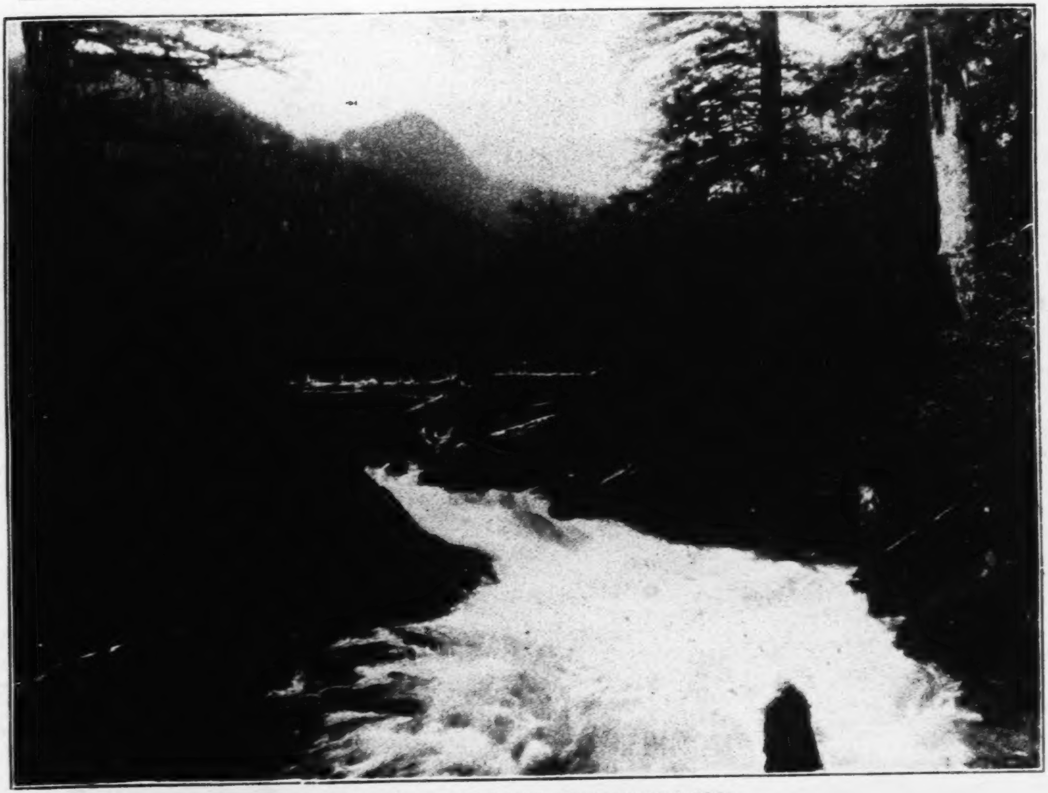
The next redfish stream in this vicinity is that which empties into Kah-Shakes Cove. It was unknown to us at the time of our visit to the Boca de Quadra, and therefore not examined. In 1897 there were taken from this stream between 6,000 and 8,000 redfish. From the records of the stream, so far as they are obtainable, it is estimated that under average conditions its annual capacity is 12,000 redfish, and the time of runs is the same as at Quadra, namely, from the middle of July to the last of August. The average weight of these fish is about 7½ pounds.

TONGASS NARROWS—KETCHIKAN.

Ketchikan is situated on the southern side of Revillagigedo Island, about 5 miles from the eastern entrance to the narrows, and is on the Alaska steamer route from Metlakahtla, or Mary Island, to Loring or northern points. The village is on the shore shelf, the houses straggling on both sides of Fish Creek. In 1890 it had a population of 40, of which number 26 were Indians.

The cannery of the Cape Fox Packing Company was moved from the Boca de Quadra to this place in the winter of 1886–87, and operated under the title of the Tongass Packing Company until it was burned. A store, trading post, and a large saltery are owned and maintained by Messrs. Clark & Martin. The senior member of this firm, Mr. George W. Clark, was formerly a Gloucester fisherman, and has been at Ketchikan about ten years, in the trading and fishing business. The saltery at Quadra, previously mentioned, is also owned and operated by this firm.

At the two salteries owned by Clark & Martin 4,000 barrels of salmon were salted in 1894, of which 2,500 were put up at Ketchikan and the remainder at Quadra. The price at that time fell to $4 and $4.50 per barrel, which made salting unprofitable, and these establishments have been operated irregularly since that date until 1897, when a certain number of fish were salted under contract. While the present year has brought a larger price for salt salmon—$8 to $9 per barrel—the firm find it advantageous to sell their fish fresh, under contract, to the canneries. Their salt product is also disposed of by contract.



OUTLET OF LAKE NEAR MINK ARM, BOCA DE QUADRA.

RAPIDS IN STREAM, KETCHIKAN.

FISH CREEK.

Fish Creek, at Ketchikan, is a little larger than the Quadra Stream, and is a lake outlet. It flows with great velocity through a rocky glen, in rapids and falls. There are no artificial obstructions to the passage of fish in this stream. It is a remarkable stream for humpback salmon, containing that species almost exclusively, though a few steelheads find their way to the upper waters. No redfish or cohoes are taken here. The steelheads probably find their way to the lake, but no other species could surmount the falls and rapids. At the time of our visit (June 9) a few steelheads were running upstream, and at one of the rapids an Indian was catching them by means of a large, pointed hook, secured to a stout pole, which he held in the current, and, by sight or touch, hooked the fish broadside on. Mr. Clark stated that steelheads seem more plentiful from the middle of May to the last of June, though he has seen some as early as the middle of April. They are so few in number that they are used for local consumption only.

The run of the humpbacks is from July 15 to September 1. They spawn in the lower courses of the stream in pools and eddies. At low water at the mouth of the river, and facing Tongass Narrows, there is a good seining beach, and it is here that the humpbacks are taken. Their average weight is 4 pounds.

In 1897 Clark & Martin used in their fisheries 1 drag seine at Ketchikan and 1 at George Inlet, each 150 fathoms long, 2¾ and 3 inch mesh, valued at $175 each; 2 purse seines at Quadra, 225 and 240 fathoms long, valued at $600 each. From 4 to 10 boats were used, and 10 whites and 30 natives were employed. At Fish Creek in 1894 500,000 humpbacks were taken; 246,000 in 1895; 300,000 in 1896, and 500,000 in 1897. In 1897 the run of humpbacks was almost unprecedented. At one haul of a seine 22,000 were taken.

The price paid by the canneries to Clark & Martin for fresh fish, delivered alongside the cannery steamer at the fisheries, was 75 cents per 100 for humpbacks, and $6.50 per 100 for redfish. If there was any call for dog salmon they received $3 per 100 for them, but very few of this species are packed.

In 1896 Clark & Martin delivered to Loring cannery 248,258 humpbacks between July 24 and August 31, and in 1897, 318,000 humpbacks from Fish Creek, and 162,000 humpbacks and 20,000 redfish from Quadra. In 1897 they salted, from Fish Creek, 500 half-barrels of humpback bellies; from Quadra, 700 half-barrels of humpback bellies; from George Inlet, 300 half barrels of humpback bellies, and from scattering places, though mostly from George Inlet, 120 whole barrels of cohoes.

WARD COVE.

About 5 miles to the westward of Ketchikan a small bay known as Ward Cove makes in off Tongass Narrows on the northern shore. A small stream empties into this cove, carrying annually about 2,000 redfish with some other salmon. There was formerly a saltery here, which was purchased by the Alaska Packers' Association and partially dismantled. Some of the buildings are still standing, and an Indian who makes his home in the cove salts a few fish.

The cannery at Loring obtained from Ward Cove in 1897, between July 24 and August 13, 1,500 redfish, 600 cohoes, and 11,000 humpbacks. The stream was not examined.

METLAKAHTLA.

Metlakahtla, or New Metlakahtla, is situated on Port Chester, on the western side of Annette Island. It consists of a community of Tsimpsean Indians who, in 1887, followed Mr. William Duncan from Metlakahtla, British Columbia, to make a home in Alaska. So much has been written of this interesting colony that a history of their progress is superfluous in this report. Suffice it to say, that all honor is due to the energetic and intelligent civilizer and preacher, Mr. Duncan. In 1856 he found the Tsimpseans hardened savages and cannibalistic in their tendencies, and was obliged to live inside a stockade for protection. After having brought them to a civilized condition through his own example and energetic teachings, some question arose in the church, and he deemed it best to retire. He was followed by about 400 of the community, and, as they were not allowed to carry with them their own belongings, they calmly faced the privations they were to endure in their new home, and to-day the New Metlakahtla stands a monument to their skill and industry and an honor to the self-sacrificing devotion of their leader.

Annette Island has been set aside by an act of Congress for a reservation for the Metlakahtlans and other Alaskan natives who may join them, under regulations prescribed by the Secretary of the Interior. An attempt has been made by some influential whites to open mines on the island. In 1890 the population of Metlakahtla was 823, of which number 817 were Indians, 4 whites, and 2 mixed.

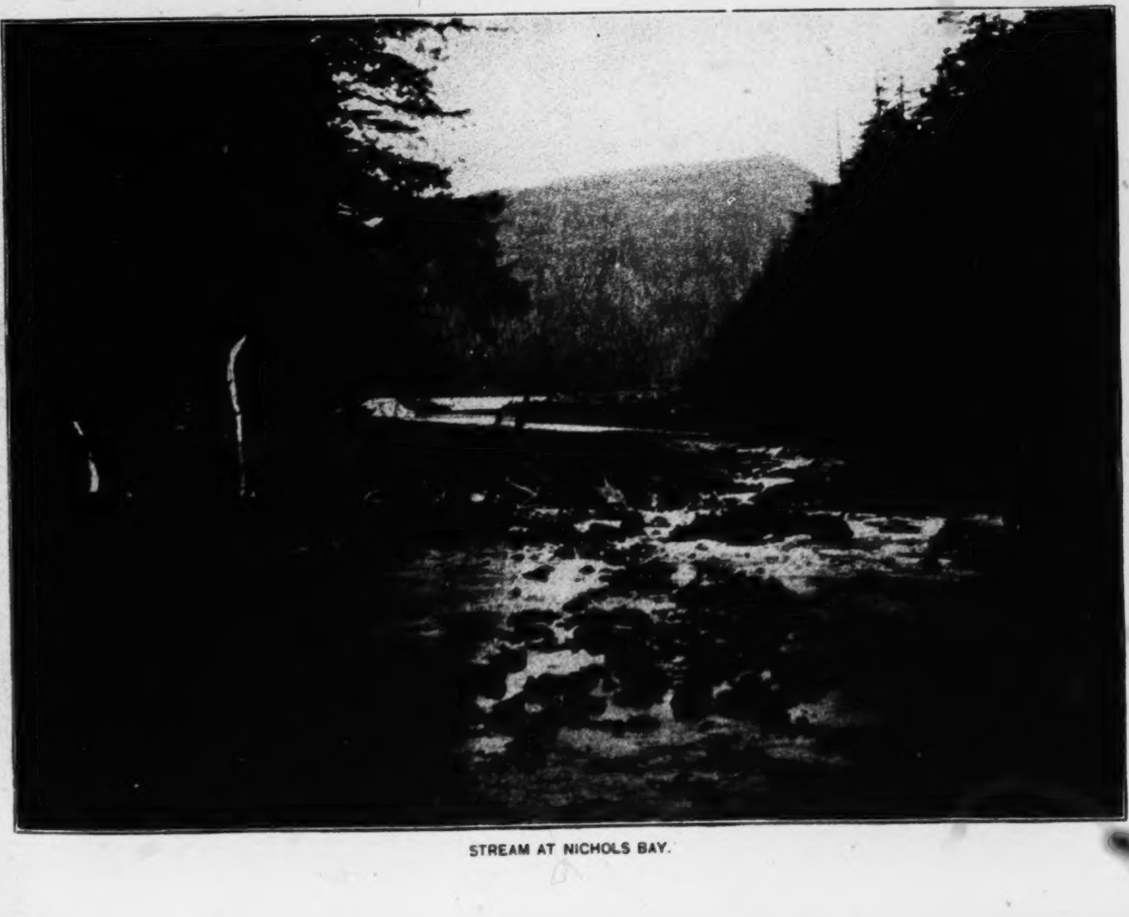
One of the principal industries of this community is salmon canning, which is carried on by an organization known as the Metlakahtla Industrial Company. When the colony moved to their new home in 1887, after the people were comfortably housed, Mr. Duncan commenced erecting buildings with a view to establishing a cannery. It took several years to obtain the necessary funds and install the machinery, and it was not until 1890 that any pack was attempted. In that year an experimental pack of only 500 cases was made. The following year it was in active operation and a pack of 5,834 cases was the result.

All parts and branches of the cannery and the fisheries supplying it are conducted by native Indians, who show considerable skill in the different kinds of work. During the time of our first visit, June 10 to 12, they were making cans for the season's pack, rebuilding the steam tender, and some 30 or 40 women and girls were making seines and nets for the use of the community and for sale. All this work is done by the Indians, and apparently well done.

The value of the cannery buildings, machinery, piping, tools, material, etc., is a little under $25,000. In 1896 the product of 72 native fishermen was used, and during August 162 natives were employed in the cannery. In the fisheries they used 9 drag seines, each 100 fathoms in length, valued at $200 each; and 2 purse seines, 120 fathoms long, worth $350 each. The vessels and boats employed were the steam tender *Marie G. Haaven* (rebuilt in the spring of 1897), valued at $3,000, of 12.8 net tons, and with a crew of 5; also 7 Columbia River boats, valued at $180 each; 2 lighters at $150 each, and 10 skiffs, etc., at $30 each.

The statistics for 1897 were about the same as for 1896, but besides the seines, 10 gill nets were tried, 180 fathoms long, 4 fathoms deep, 5½-inch and 6-inch mesh, and valued at $150 each; and in addition to the *Marie G. Haaven*, another steamer, the *Herald*, was purchased. This was of 19.4 net tons burden, had a crew of 5, and was valued at $7,000.

SALMON CANNERY, METLAKAHTLA.



STREAM AT NICHOLS BAY.

The following table shows the packs at Metlakahtla for 1896 and 1897:

Species.	1896.				1897.	
	No. of cases.	Number of fish per case.	Value per case.	Date of packing.	No. of cases.	Date of packing.
Redfish	8,280	*12	$3.80	July 1 to Sept. 5	7,060	July 8 to Sept. 2.
Cohoes	1,500	6 or 7	3.40	Aug. 1 to Sept. 10	840	July 20 to Sept. 2.
Humpbacks	7,420	21 or 22	2.40	July 21 to Aug. 22	7,200	July 20 to Aug. 26.
Do-overs	450		3.00	July 1 to Sept. 10	300	
Total	17,650				15,400	

* Quadra redfish ran 8 to the case; those from Moira Sound, 15 to the case. The average was about 12.

The gill nets were not very successful, the failure being attributed to a too large mesh. Mr. Duncan thinks that 5 and 5½ inch mesh might have done better work. Gill nets have been tried all over Alaska and are now used with success only where the water is discolored; if the water is clear the fish see the net and the catch is small. In some places, where the waters are discolored, gill nets only are used. Of these places, there may be mentioned the mouths and approaches of the Unuk, Stikine, Taku, and Chilkat rivers in southeast Alaska, Copper River, Cook Inlet, and the Bering Sea district. Fish can be taken in gill nets in other places, but where the water is clear other fishing methods are far more successful.

The Metlakahtla cannery pays for redfish, according to locality, from $5.50 to $7 per 100; for cohoes, from $10 to $14 per 100, and for humpbacks, $1.50 per 100. These prices are unusually high. The redfish is, of course, the species most sought for, but as the canneries increase in number and the output becomes larger, more humpbacks and cohoes are packed to fill up the cannery quota.

The home stream at Metlakahtla lies about 2 miles north of the anchorage, inside of Copper Point. It is about 1¼ miles long, 90 feet wide, and 12 to 15 inches deep, and flows in numerous rapids of easy ascent from the lake of which it is the outlet. The lake is about 3 miles long, half a mile wide, and has connected with it other smaller lakes, but does not appear to have any inflowing stream, being fed by falls and cascades. The banks of both stream and lake are wooded. The outlet is very rocky, and the lake is deep without much shelving; from report it has no extensive spawning-ground.

The average number of redfish taken per year from around the mouth of this stream, for six years, was 8,000; the average time of the catches, from July 8 to August 11; average weight, from 3½ to 4 pounds. A few hundred cohoes are taken from July 22 to September 1.

Off the mouth of the river, and well out in the bay, there seems to be a schooling-ground for humpbacks, of which the average catch for four years was 38,000 per year, the run extending from July 27 to August 30. A considerable number are furnished for local use.

On the eastern side of Annette Island, and opposite Mary Island, is another schooling-ground for humpbacks. In 1893 the Metlakahtla fishermen took from this locality, between August 1 and 26, 140,000 humpbacks; in 1896, between August 3 and 22, 68,000; and in 1897, between July 27 and August 7, 29,000.

The cannery at Metlakahtla has received redfish from Quadra and Kah-Shakes also, though the latter stream furnished none here in 1896 and 1897.

GEORGE AND CARROLL INLETS—THORNE ARM—DUKE ISLAND.

From George Inlet about 3,000 redfish, of an average weight of 5 pounds, and occasionally a few cohoes and humpbacks, are obtained. The redfish are taken from July 1 to August 1, the cohoes from the middle of July to the middle of August, and the humpbacks from July 20 to August 15. In 1897 none were received. The exact location of the redfish stream was not ascertained, and it is generally said that only cohoes and humpbacks are found in George and Carroll inlets and in Thorne Arm.

From Duke Island the Metlakahtla cannery receives about 3,000 redfish, of an average weight of 5 pounds; the earliest date given was July 7 and the latest August 28. The streams furnishing these fish empty into the coves at Bay Anchorage, on the eastern side of the island. There are a great number of these small streams throughout Alaska capable of supplying 2,000 to 4,000 redfish, but as a rule the canneries do not bother with them. Under favorable conditions the natives deliver the fish to the canneries or to the tenders in passing.

TAMGASS HARBOR.

Tamgass Harbor supplies an average of 9,000 redfish between July 2 and August 12, though they have been taken as early as June 28 and as late as August 26. These redfish run small, the weight being between 3½ and 4 pounds. A few humpbacks (20,000 in 1897) have also been taken from this locality as early as July 17 and as late as August 26. The stream supplying these fish is on the eastern side of Tamgass Harbor, Annette Island.

The other streams supplying fish to the Metlakahtla cannery are on the eastern side of Prince of Wales Island, in Moira Sound and vicinity, and will be referred to hereafter.

HUNTER BAY.

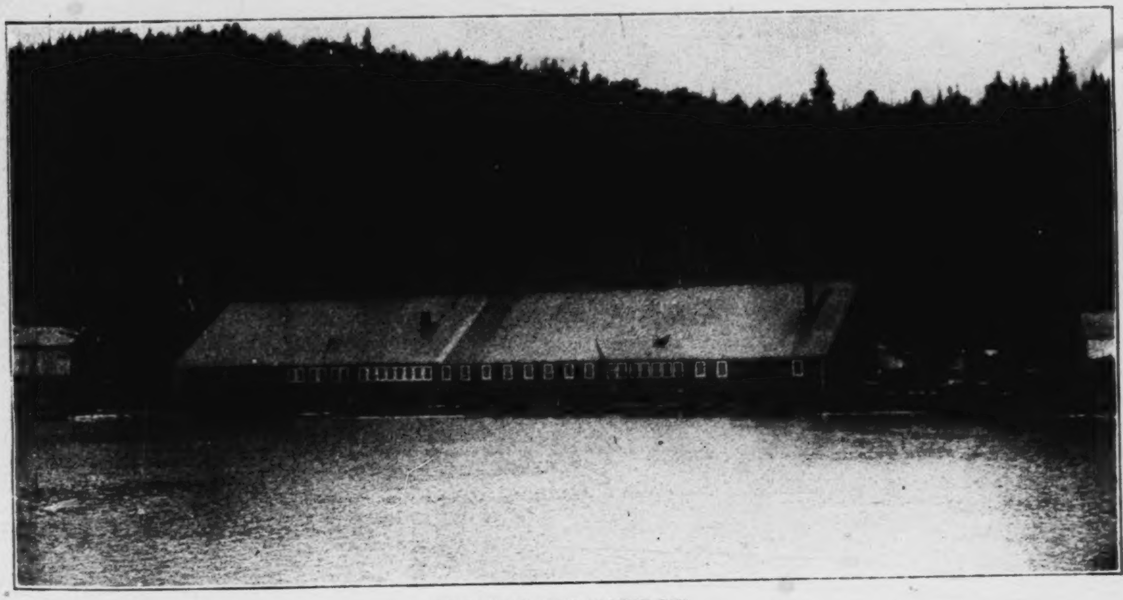
Hunter Bay is an arm of Cordova Bay, on the western shore of Prince of Wales Island, about 10 miles north of Point Marsh. It is about 2½ miles long and from 5/16 to 9/16 mile wide, with a branch, about midway, extending to the northward. This bay, with the surrounding waters of Cordova Bay, on which, with its branches, are located the salmon streams fished by the Hunter Bay cannery from Point Marsh northward, is unsurveyed.

The cannery operated by the Pacific Steam Whaling Company is on the northern shore of the bay, about 1½ miles from the entrance and about ¾ mile from the head, which receives a redfish stream. The building was commenced in March, 1896, and a sufficient plant was in position to make a pack that year of 27,442 cases. A saltery formerly owned and operated on this site by Miller & Co. was purchased by the Pacific Steam Whaling Company, and removed to make room for the cannery. The main building, like all those of the Pacific Steam Whaling Company, is 270 feet long, double-boarded, painted brown, and is roomy, well ventilated and lighted, in striking contrast with many of the other canneries.

In 1896 the company employed 8 white and 45 Indian fishermen, and in the cannery 6 whites, 6 natives, and 58 Chinese. They used 9 drag seines, average length 75 fathoms, valued at $1.25 per fathom; 1 purse seine, 175 fathoms long by 12 fathoms deep, valued at $522, and another, 175 fathoms long by 7 fathoms deep, valued at $300.

The tenders used were the tug *Alice*, of 20 tons net, crew 5, value $10,000, and a small decked launch, the *Minnie M.*, of 3 tons, crew 2, and valued at $400. There were also employed 3 lighters, valued at $100 each; 5 seine skiffs, $50 each; 2 whaleboats, $85 each; 2 trap drivers, $750 each, and 2 purse-seine scows, $150 each.

SALMON STREAM, EAST SIDE, PORT CHESTER.



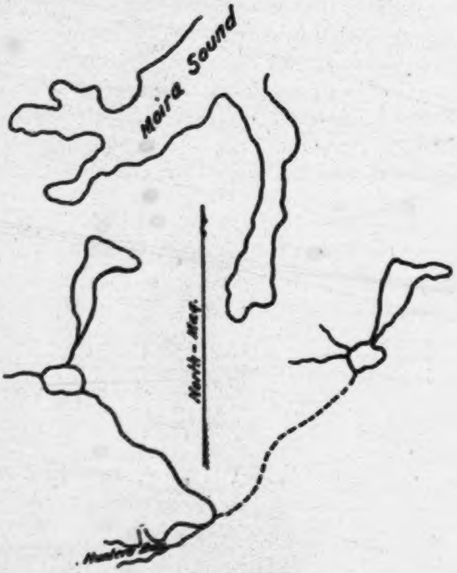
SALMON CANNERY, HUNTER BAY

The cannery equipment in 1897 was the same as for 1896, except that, in addition, the steamer *Columbia*, 70 tons net, crew 9, was chartered, and 3 seines, 3 seine boats, and 27 fishermen were employed.

The following statement gives the pack of Hunter Bay cannery for 1896 and 1897:

Species.	1896.				1897.		
	Dates.	Number of fish per case.	Number of cases.	Approximate number of fish used.	Dates.	Number of fish per case.	Number of cases.
Redfish	July 10 to Sept. 20	10.3	15,386	159,130	June 27 to Sept. 25	13	13,162
Cohoes	Aug. 1 to Sept. 26	7	5,654	39,583	Aug. 16 to Sept. 25	7	5,300
Humpbacks	July 21 to Aug. 29	19	6,402	121,641	July 6 to Aug. 31	19	15,926

In 1896 all the streams from Nichols Bay on the south to Hetta on the north, and including Dall Harbor and Essawa, on Dall Island, were fished to supply this cannery. We visited all the streams in the district except those on Dall Island, which furnished only 3,600 redfish. As the cannery had been operated only one year at the time of our visit, there were no earlier stream records available from which averages or general deductions could be made.



Sketch of Hunter Bay Lake System.

Hunter Bay stream, which empties into the head of the bay about three-fourths of a mile from the cannery, is of considerable size. About one-fourth of a mile above the cannery the bay narrows and shoals to the head, which is bordered by grassy plateaus, forming the banks around the mouth of the stream. It is a beautiful stream and runs over a bouldery bed, between rocky banks covered with a dense forest growth, for a distance of 4½ miles from its lake source to the sea, in a general southeast and northwest direction. It is from 100 to 120 feet wide and a foot deep. There are no obstructions here now, and the flow of water, while rapid, is not much broken and affords an easy ascent for the fish.

The lake is about three-fourths of a mile long by half a mile wide, is deep, and has a large inflowing stream near the upper or northern end, which is connected with a second long L-shaped lake on the northern side. The banks are heavily wooded. There were no means for examining the lake beyond the outlet, and the information in regard to the second lake and the entering stream is from local authorities. Judging from the flow at the outlet, the lake must receive a large amount of water.

Mr. Miller states that this stream should yield 50,000 redfish; but in 1896 the cannery obtained, from July 10 to 31, only 5,318 redfish and 4,937 humpbacks; during August 2,300 redfish, 80,845 humpbacks, and 4,836 cohoes; in September, up to the 20th, 8,645 cohoes—a total of 7,618 redfish, 85,782 humpbacks, and 13,481 cohoes.

The catch in 1897 was: From July 6 to September 26, 3,848 redfish; from July 24 to August 20, 44,501 cohoes.

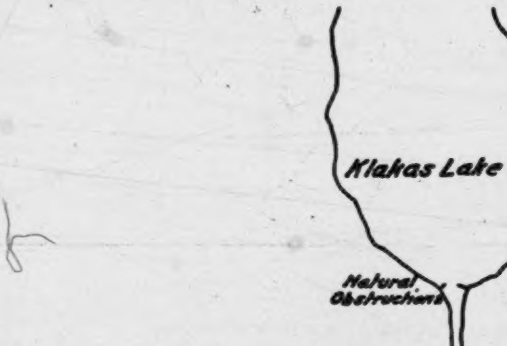
It was not learned whether the stream has ever been barricaded.

The Hunter Bay stream and the one at Nichols Bay would no doubt afford good sites for hatcheries, though careful examination is necessary to determine a point of this kind. There is an abundance of water (which would probably have to be filtered), and an excellent place at each stream could be arranged to hold the fish till ripe. Usually the lake waters undergo a considerable change in temperature during the summer, while the entering streams remain constant and low. Yet these entering streams can not always be utilized, because they are inaccessible and may not afford the abundance of fish which the mouth of the outlet does. The cannery company at Hunter Bay is considering the establishment of a hatchery, which will probably prove successful. With so many excellent sites for hatcheries, the first requisite in this country is accessibility; the second is plenty of fish of a large variety. Water can be obtained anywhere.

Above the cannery, where the bay narrows and shoals toward the head, a trap was driven during our visit. Below the cannery an arm makes to the northward from the bay. At the end of this arm is a narrow passage, or "skookum chuck," as it is called in this country, leading into a bay which receives a small stream carrying a few redfish; it was barricaded. About a mile beyond, on the northern side, is another lagoon making in from the bay, with the entrance obstructed by three islands. This was also examined, but no salmon stream of value was found.

KLAKAS INLET AND STREAM.

Near the entrance to Hunter Bay a long, deep bay called Klakas Inlet makes in a northerly direction for a distance of 12 to 15 miles. It is a beautiful sheet of water, with an average width of about 1¼ miles. At the entrance, which is obstructed by islands and reefs, and on the end of the peninsula formed by Klakas Inlet and Hunter Bay, is the Haida village of Klinkwan, one of the older native settlements, and not yet under missionary influence. It contains a large number of carved poles, other totemic symbols, and a few of the old Indian community lodges with interior decorations.



Sketch of Klakas Stream and Lake.

There is one red-salmon stream in Klakas Inlet, on the eastern shore, about 10 miles from Klinkwan. It is the outlet of a lake, and is about a mile long, from 20 to 30 feet wide, and 10 inches deep, with pools under 6 feet in depth. The water in this, as in all these lake outlets, is of a brownish tinge, probably from decomposed vegetable matter. At the head of tide water in the stream is a rapid,

LAKE AT NICHOLS BAY. LOOKING UP LAKE FROM NEAR OUTLET.

which in a distance of 100 yards has a fall of about 20 feet. At this point a barricade of a form similar to those described has been built entirely across the stream, thus effectually preventing fish from ascending.

The lake is 3 to 3½ miles long by ¾ mile wide. The waters seem deep and the shores are high and heavily wooded. There were no means for making a detailed examination of it. The outlet at the lake is about 30 feet wide and 2 feet deep; the current is strong. The banks are high, rocky, and heavily wooded. Besides the barricade, there are a number of log jams, through which fish may, however, find a passage.

The Hunter Bay cannery obtained fish from Klakas in 1896 as follows: From the 1st of July to the 31st, 3,932 redfish and 1,269 humpbacks; during August, 3,382 redfish, 31,200 humpbacks, and 417 cohoes; in September, up to the 20th, 2,240 cohoes; a total of 7,314 redfish, 32,469 humpbacks, and 2,657 cohoes.

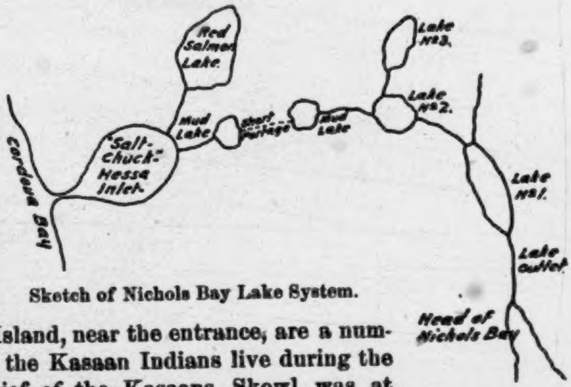
In 1897 the following were taken: Redfish, 23,330, from July 4 to September 26; humpbacks, 108,031, from July 23 to August 31.

The Klawak cannery (hereafter referred to) in 1887 took from Klakas 6,960 redfish between July 3 and September 13, and 2,370 from July 11 to 31, 1888. These are all the records obtainable. The stream is thought to have a capacity for 7,000 redfish.

Between Klinkwan and Klakas are several small streams that contain a few cohoes and humpbacks.

NICHOLS BAY AND TRIBUTARIES.

This bay is on the southern extremity of Prince of Wales Island, with its entrance between Cape Chacon and Point Nunez. At the head of the bay a lake outlet discharges its waters, carrying red salmon (which are considered nearly equal in size to the Quadra fish) and cohoes. In a bight on the southern shore are the remains of an abandoned saltery established and operated by Mr. Miller, of Klinkwan, about 1889, and sold to the Pacific Steam Whaling Company. On the northern shore, and opposite the abandoned saltery, is a stream with a large flow, which has runs of humpback and dog salmon only; at its mouth, on the right bank, are several shacks and a smokehouse. No white people live in this vicinity. On Bean Island, near the entrance, are a number of shacks in which some of the Kasaan Indians live during the halibut-fishing season. The chief of the Kasaans, Skowl, was at Nichols Bay at the time of our visit, and came on board with some of his followers. The only stream of value in this vicinity is the one emptying into the head of the bay. This stream is said to have been barricaded for six or eight years, and in examining it, at a short distance from its mouth a barricade was found which extended entirely across the stream. The day after the examination, men were sent from the *Albatross* with blocks and tackles to pull out the barricade. The rails were removed, but they could not budge the beam. As salmon inspectors are expressly provided for the execution of the law, and as nothing short of dynamite would effectually remove the obstruction, the work was abandoned.



Sketch of Nichols Bay Lake System.

Nichols Bay stream at the barricade (head of tide-water) is about 60 feet wide, at the lake outlet about 150 feet, and was at the time of our visit about 12 inches deep. The flow is quite rapid, with no natural obstructions to the passage of fish. The distance from the lake to the mouth is about a mile, and the stream flows over a rocky, bowldery bed. The banks are densely wooded, and the mountains abut close on either side, rendering a passage along them almost impracticable. Redfish and cohoes formerly ran here in large numbers.

There were no means of exploring the lake, the banks of which were impassable. So far as could be judged, it is about 2 miles long and one-fourth of a mile wide. The banks are not very high, and there seems to be a shore shelf before the rise to the higher mountains. It was learned that Nichols Bay Lake has a large inflowing stream near its head, and near the mouth of this stream is a smaller one, connecting the first lake with a second or smaller one. This second lake has an entering stream, the connection with a third lake, and another stream connecting it (the second lake) with a fourth. The fourth lake is shallow, with pond lilies growing over it, and from its head there is a portage to a mud lake which has an outlet into the salt chuck at Hessa, on the western side of the island, about 5 miles to the northward of Point Marsh. Into this salt chuck another stream empties, also a lake outlet, which carries salmon and which will be referred to later.

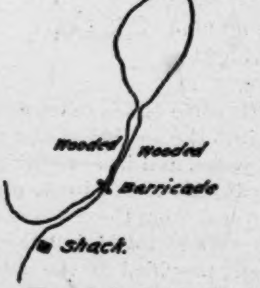
The following table shows the catch from Nichols Bay stream in 1896 and 1897:

Species.	1896.		1897.	
	Dates.	Number of fish.	Dates.	Number of fish.
Redfish	July 10 to Aug. 31	81,192	July 6 to Aug. 31	11,218
Cohoes	Sept. 1 to Sept. 20	550	Aug. 16 to 31	1,313
Humpbacks			July 24 to Aug. 29	54,772

HESSA INLET.

Hessa Inlet is about 7 miles southeast from Hunter Bay, and is a large landlocked bay or inlet, about 3 miles long, approached by an entrance scarcely 100 yards wide, through which the tidal current rushes with such velocity that it can only be navigated near or at slack water. At the northern end of the bay is a fisherman's shack, and near it enters a small stream, the outlet to a shallow lake. This outlet is about half a mile long, 25 feet wide, and was about 8 inches deep at the time of examination; it rises to the lake, about 10 feet above high water.

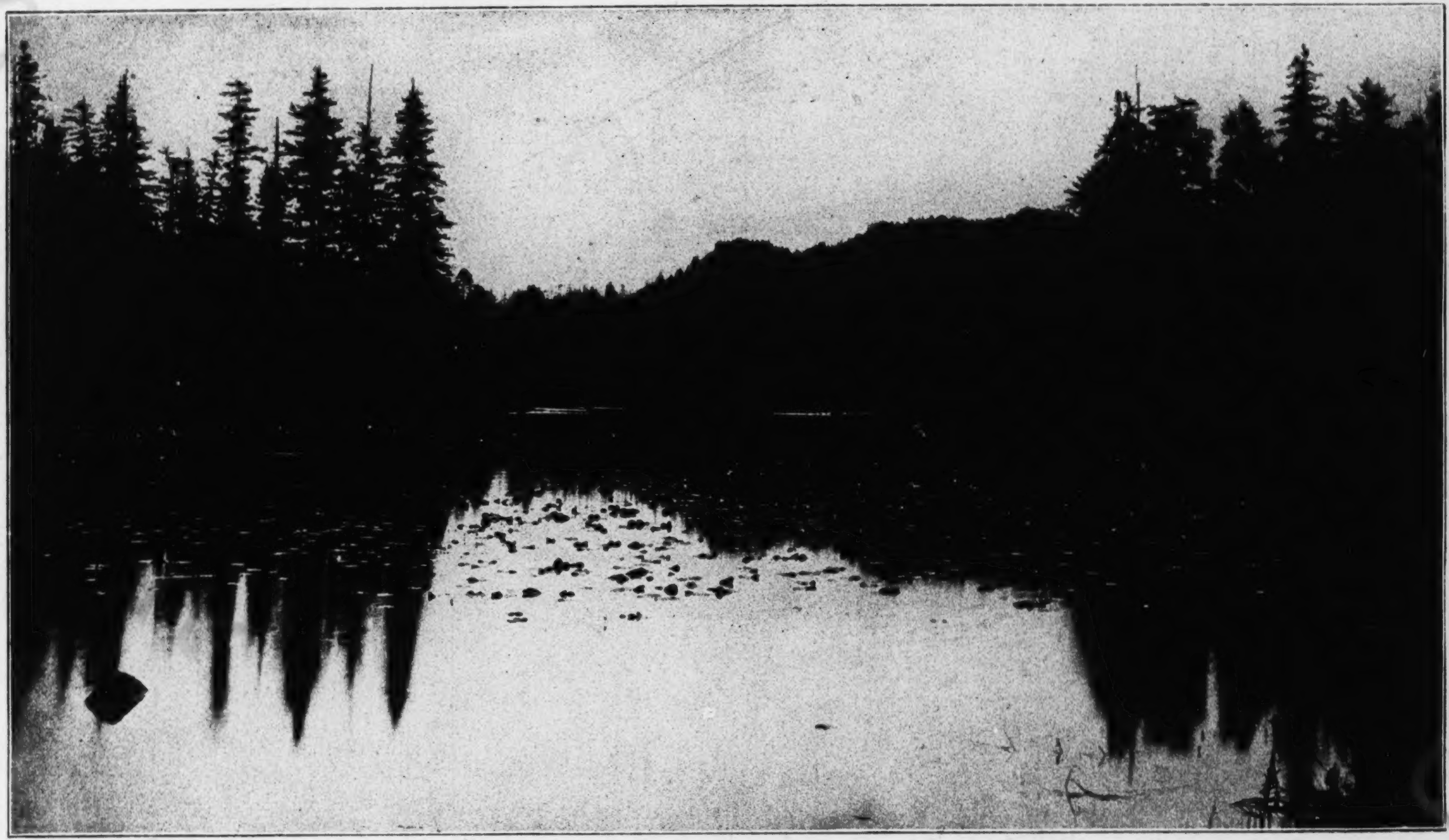
The lake is of irregular outline and about 1 mile long, ramifying in various directions; it is shallow, with a rocky bottom partly covered with gravel or mud. This body of water is in many places surrounded by grassy and marshy banks. In the outlet, at the head of tide water, is a barricade across the full width of the stream built in the usual manner, but with the addition of 2-inch-mesh wire netting, the whole forming such an effectual obstruction that not a single fish can pass upstream. A tree partly felled and ready to fall across the stream is on the right bank.



Hessa Lake and Outlet.

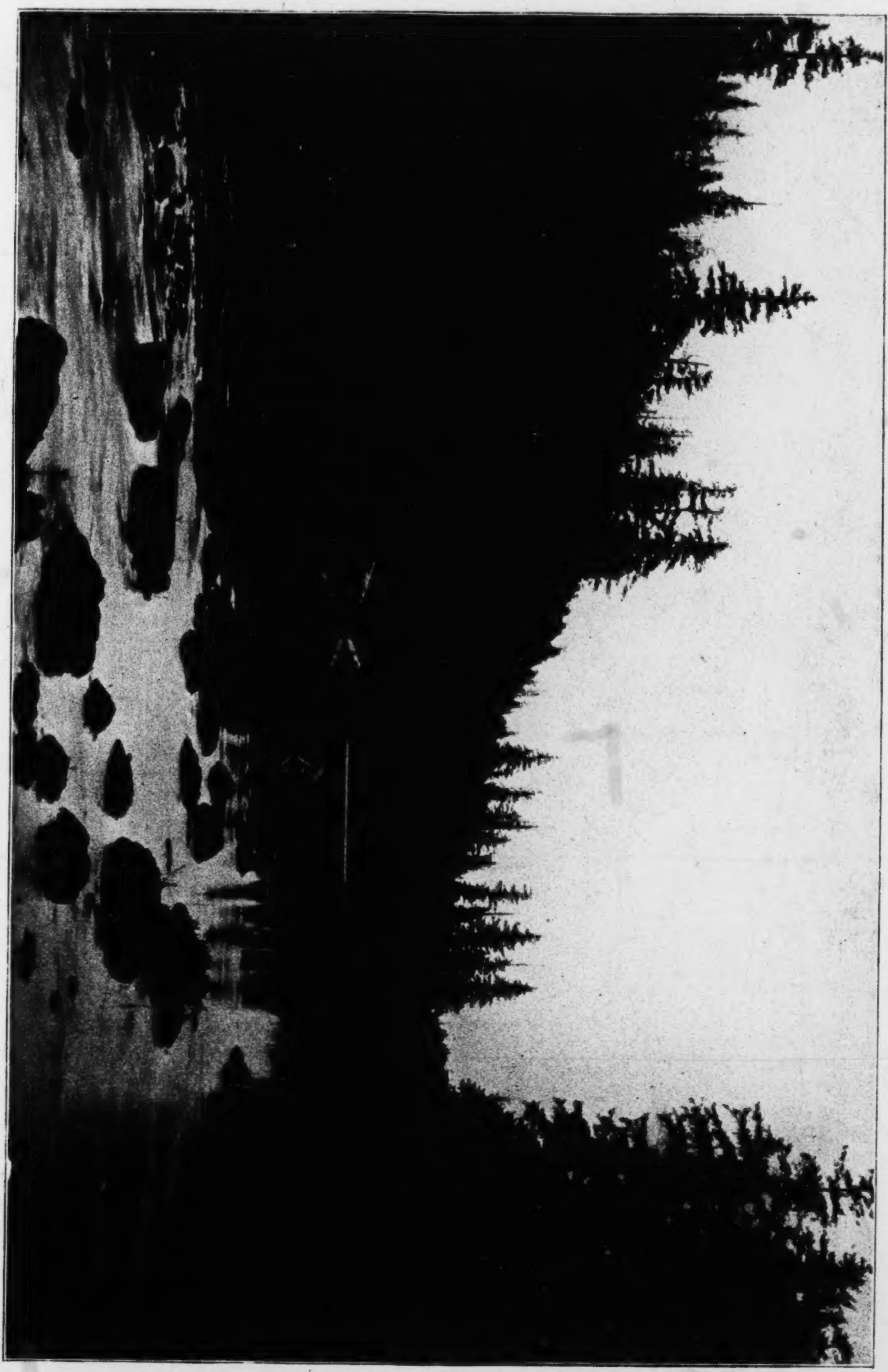
The cannery record gives no catch of salmon from Hessa in 1896 except 5,215 cohoes, taken in August and up to September 20, though the superintendent stated

PLATE 26.



LAKE AT HESSA. VIEW FROM NEAR OUTLET, LOOKING TOWARD HEAD.

PLATE 27.



(OUTLET OF LAKE AT HESSA.

that about 2,000 redfish were also taken. Mr. Miller states that Hessa formerly yielded about 12,000 redfish, but probably it would not yield that number now.

The fishing for the cannery during 1896 was all done by its own men. The tender called at several of the small fisheries to make a single load, and when the fish were discharged they were all entered as coming from one place, the cannerymen not being interested in exact records.

Below Hunter Bay is a small stream, called Tar, from which less than 1,000 cohoes are taken.

NUTQUA INLET.

This is a wide, deep indentation, which makes into Prince of Wales Island, about 15 miles north and west of Klinkwan. At the upper end of the bay, on the eastern side, are a saltery, a dwelling, and some shacks formerly owned by Mr. Miller, but which were sold to the Pacific Steam Whaling Company. At the head of the bay, about 1½ miles from the saltery, is a narrow bowldery passage, less than a mile in length, which leads to a brackish lagoon. The level of this lagoon is a few feet below high water, so the passage is a "skookum chuck," through which the water runs in whirls and rapids almost constantly and with great velocity. The lagoon, or brackish lake, is 5 or 6 miles long by ½ mile wide, and has at its head the mouth of an outlet to a lake, which is said to be several miles distant. This outlet, it is reported, runs over a sandy and gravelly bed. During the visit of the party it was impossible to take the launch through the rapids into the lagoon, and a specific examination could not be made during the limited time at our disposal.

In 1896 the Hunter Bay cannery obtained from this place the following: During August, 150 redfish, 500 humpbacks, and 1,860 cohoes; during September, up to the 20th, 700 redfish and 7,812 cohoes; a total of 850 redfish, 500 humpbacks, and 9,442 cohoes.

In 1897, 8,086 cohoes were taken from August 26 to September 26. This probably does not represent the value of the locality, as it was not fished constantly during either season. It is essentially a coho stream, though the other species also occur.

The saltery was erected in 1895. It is about 80 feet long by 30 wide and is valued at $600; there are also 14 tanks worth $20 each, and some shacks valued at $200. The barrels used are manufactured on the place. No bellies are salted. In 1896 there were very few fish of any kind salted, and in 1897 none were salted. For saltery purposes the fishery has a capacity of 400 barrels a year.

HETTA INLET.

Hetta Inlet is the next to the northward of Nutqua, parallel to it, and separated from it by the long, narrow peninsula which terminates in Lime Point. About 6 miles from the latter point, and nearly midway up the inlet an indentation or bay on the eastern shore receives at its head the outlet from Hetta Lake. There is a shack at the mouth of the outlet, a house near by, and on the southern side of the bay a new house for the fishing crews of the Klawak cannery is located. The outlet runs east-northeast and west-southwest; it is only about one-fourth of a mile long from high-water mark to lake, and about 30 to 50 feet wide at low water, with an average depth of 8 inches. The bottom is rocky and the banks heavily wooded, as, in fact, is all of this country. There are several natural obstructions across the stream which could readily be utilized as barricades. There are no barricades in the stream now, though it is said that until a few years ago it was barricaded every year.

The lake is about 10 feet above high water, and is 1½ miles long. Its lower part is circular and 1 mile in width, the upper part ¾ mile in width, and all apparently deep. The general direction is north by east and south by west. A low point juts into the lake on the northwest side. At the upper end the shore is low, heavily timbered, with some grassy spots, and with gravel and sand in places along the shore margin. On all other sides the mountains, from which a number of cascades enter, are precipitous to the lake. A stream 10 feet wide, with an average depth of 4 inches, enters at the upper end. It runs through bottom land over a sandy and gravelly floor, and has a number of pools. The outlet at the lake end is covered with driftwood, which, however, does not prevent the passage of fish.

If Hetta stream has not received some accessions from other localities, it is probably being overfished. It may be classed now as being able to yield 150,000 redfish, though under average conditions 50,000 seems to be the limit. Fish have been taken as early as June 27 (1897) and as late as September 26 (1897). During September, 1896, up to the 20th, 40,529 redfish were taken by the Hunter Bay cannery, and were said to be in good condition. This late catch is attributed, however, to the dry season and the extreme low water in the stream, which prevented them from ascending until after the September rains had raised the water, the result being that fish were held at the mouth and taken when desired. The September catch for 1897 could not be obtained.

Hetta is one of the first-class red-salmon streams in southeast Alaska, and ranks with Quadra and Nichols Bay. It has been fished by the Klawak cannery since 1886, and, with their home stream, has been the main source of fish supply for that cannery. When fishing for this cannery commenced here the rights of the Indian claiming the stream were recognized and a 20-year lease was made with him at an annual rental. In 1896, when the Hunter Bay cannery came into the field, it is said the owners declined to make any agreement in regard to this fishery, and the Klawak cannery at present pays no rental. Hetta is now fished by both canneries, and it is reported that this year there was some trouble between the different fishing parties. This is mentioned simply to show how complaints arise, first on the part of the Indians and then on the part of the canneries. It usually results in the survival of the most powerful corporation, and the Indian goes to the wall.

The following statistics show the Hetta stream catch since 1886:

Year.	Klawak cannery.			Hunter Bay cannery.		
	Species.	Dates.	No.	Dates.	Species.	No.
1887	Redfish	July 3 to Sept. 14	24,022			
1888	do	July 4 to Aug. 26	47,468			
1889	do	July 6 to Aug. 28	48,585			
1890	do	July 6 to Aug. 28	59,673			
1891	do	July 11 to July 16	1,069			
1892	do	July 16 to Aug. 22	51,479			
1893	do	July 11 to Aug. 23	10,596			
1894	do	July 7 to Aug. 31	47,769			
1895	do	July 3 to Aug. 24	78,464			
1896	do	June 29 to Aug. 23	104,602	July 10 to Sept. 20	Redfish	96,607
1897	do	July 7 to Aug. 30	84,980	June 27 to Sept. 26	do	114,796
1897	do			Aug. 23 to Sept. 26	Cohoes	12,964
1897	do			July 29 to Aug. 31	Humpbacks	28,196

The increase in the catch for the last three years is remarkable. In 1895 it was nearly double the average of previous years. In 1896 and 1897 it was five times that average, and it must be remembered that in 1895 the stream was only fished for Klawak cannery. It might be inferred that the increase was due to the two fishing

PLATE 28.

OUTLET OF HETTA LAKE, FROM ABOVE.

gangs, and therefore to overfishing, but the statement is made that there is a marked increase of fish in these waters, and that other streams in this vicinity have felt it. When questioned as to the probable cause, the fishermen claim that these streams are receiving the adult fish produced by Mr. Callbreath's hatchery on Etolin Island, which was built and began operating in 1892, turning out 600,000 fry that year, and increasing until the present year, when about 5,000,000 eggs were hatched. The stream on which this hatchery is located is known as a poor salmon stream. There have been as yet no returns from the hatchery work, but the fishermen on the southwestern coast of Prince of Wales Island believe that Mr. Callbreath's fish are coming to their streams.

EEKE INLET.

This is a small arm making into the peninsula opposite Hetta and separating Hetta Inlet from Sukkwan Strait. It is narrow, about a mile long, and has a general east-and-west direction. About one-fourth of a mile from its head lies the mouth of a stream—a lake outlet—15 feet wide and about 6 inches deep, which carries red salmon. At low water the stream discharges over a cascade, and about 100 yards from the entrance is a fall a few feet high, and which is about high-water mark. Above this the stream is sluggish and opens into shallows and pools varying in width from 50 to 300 yards. A mile from the entrance the stream opens into the lake, which is about a mile long with a greatest width of half a mile. It lies at the foot of a mountain ridge and runs about west-northwest and east-southeast. The bottom of the lower part of the stream is clear rock; the upper part, where it opens out, could not be examined for want of time. Part of an old barricade was found between the entrance and high-water mark.

The Klawak cannery has taken a few scattering redfish here, but never more than 1,000 during a season. In 1896 the Hunter Bay fishermen took 8,688 redfish from Eeke between July 10 and the latter part of August. In 1897 they caught 9,213 redfish from July 14 to September 26; 473 cohoes from August 16 to 31; 25,400 humpbacks from July 31 to August 31. A few fish were salted here in 1896.

The stream may be said to have an annual value of 7,000 redfish.

SUKKWAN.

Leaving Eeke and passing around the point, up Sukkwan Strait to the westward about 5 miles, is the village of Sukkwan, consisting of a saltery and about a dozen houses and shacks. The village is on a bay, about a mile long and of the same width, at the head of which is the salmon stream. A few scattering redfish only are taken, the run consisting of cohoes, and humpbacks; the former run from August 5 to September 30, and the latter from July 20 to August 25. The Klawak cannery in 1890 took 4,403 cohoes between September 5 and 7; and 607 in 1897, between August 21 and 30. In 1896 the Hunter Bay cannery obtained from Sukkwan 4,830 cohoes from the last of August to September 20; and in 1897 it took 3,317 cohoes from August 24 to September 26.

The saltery is operated by Banter & West, who this year (1897) packed about 300 half-barrels of humpback bellies, selling their fresh fish principally to the canneries. So far as could be learned, this saltery has never packed more than 200 barrels; in 1896 the output was 175 barrels of cohoes.

They use one drag seine, 70 fathoms by 6 fathoms, with 2¾-inch mesh.

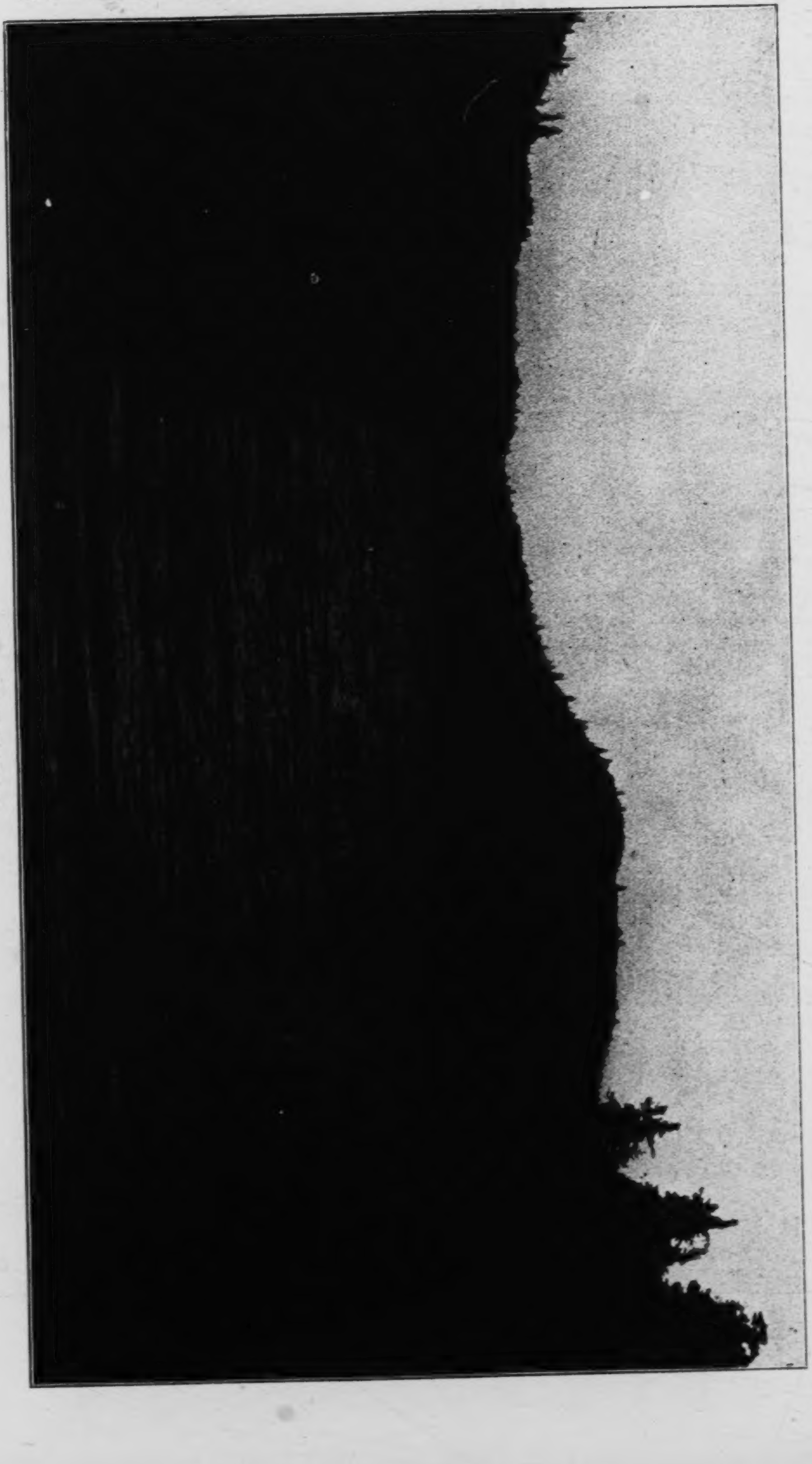
KASSOOK INLET.

Kassook Inlet extends into Sukkwan Island in a general northwesterly and southeasterly direction from a point about 2 miles west of Jackson Island. It is about 2½ miles long and from one-fourth to one-half mile wide. Near the head of the inlet on the western side a saltery was, at the time of our visit, in course of construction by Miller & Co., of Klinkwan, with the intention of salting humpback bellies and selling redfish to Loring and Klawak. An Indian shack is on the opposite side of the inlet.

Saltery at Kassook.

At the head of Kassook Inlet is the mouth of a lake outlet. It is only a small, shallow stream about 20 feet wide. At the point of high-water mark, where the width is about 20 feet between banks, is an old barricade. Above this the stream is rough and rocky, and flows from a rocky slough 200 yards beyond, which is a part of the lake and is about one-fourth of a mile long by 100 yards wide. This slough, as well as the lower part of the lake, is covered with pond lilies.

The lake proper is about three-fourths of a mile long in a general northwest-by-west and southeast-by-east direction, the upper part circular and about half a mile in diameter. The surface is only about 10 feet above high water. The shores are flat and wooded, grassy in places, especially near the feeders, of which there are several near the head and on each side of the outlet. There are some sand and gravel beaches. The entering streamlets average about 12 feet between banks, with a very slight flow at the time of our visit, but the indications are that they discharge a considerable amount of water during the rains. Around the mouth the bottom is sandy and expands into pools. The water of all these lake outlets is slightly discolored.



KASSOOK LAKE, FROM OUTLET.

It is said that in prospecting this inlet several years ago 10,000 redfish were taken in two weeks; but this statement should be received with caution, as no available records bear it out. In 1897 the cannery at Klawak took from Kassook stream 1,361 redfish; in 1888 it took 1,829 redfish from July 11 to 24, and a few hundred have been taken in subsequent years when the cannery steamer with a fishing gang was in that vicinity. In 1896 the Hunter Bay cannery took 1,340 redfish during July; in 1897 it took 1,054 redfish between July 14 and August 1, and 20,456 humpbacks from August 1 to August 31.

A fair estimate for the capacity of the stream would be 4,000 redfish.

GENERAL FEATURES OF HUNTER BAY REGION.

The foregoing streams (Nichols Bay, Hessa, Tar, Hunter Bay, Klakas, Nutqua, Hetta, Eeke, Sukkwan, and Kassook) supply fish to the Hunter Bay cannery. In addition, there are two small streams on Dall Island, from which together only 3,600 redfish were taken in 1896, and 812 in 1897. These were not visited. In 1897 the same cannery took also, from scattering localities in the region, 7,885 cohoes from August 24 to September 26, and 23,020 humpbacks from July 20 to August 31.

The earliest red salmon to arrive in the district are scattering individuals, which may be seen jumping as early as June 20, in the vicinity of Hetta, where they seem to make their appearance before they do at Hunter Bay. By July 4 small schools have usually arrived, and from the 8th to the 15th they increase in large numbers until the height of the run, from July 15 to 25. From the latter date to August 1 they commence to decrease, and after August 1 they are taken in connection with other salmon—cohoes and humpbacks—though they continue in good condition for packing until August 20. There is, however, great variation in the length of the runs on account of the small streams, which are much influenced by wet and dry seasons, as instanced in 1896 (which was very dry), when red salmon were packed until the 20th of September at the Hunter Bay cannery. Thousands of fish may be held at the mouth of a stream by the low water, and the rain of a single night may raise the stream sufficiently to allow the whole school to ascend in one body. The average weight of redfish packed at the cannery is under 6½ pounds. Those coming from Nichols Bay average nearly 8 pounds.

Cohoes are taken from August 1 to October 20. Their run is chiefly between August 15 and September 15. As the canneries close about September 20, the last of the run is not packed. The cohoes average much larger than the redfish, but they also require more water in the streams, and if the rains are late the run is correspondingly extended. The average weight of cohoes packed at Hunter Bay cannery is 9 pounds, but some weigh as high as 20 pounds. Cohoes are not very plentiful in any one place in Alaska, but they are found scattering in all localities. They have not been sought to any great extent, as the run is small and continues after the canneries close. Next to the king, they are probably the best salmon for the table on the Pacific coast, either fresh or canned; but most people eat salmon by color and reject the coho because it is paler than some other species.

Humpbacks are taken in large numbers from July 25 to August 25, subject to variations due to the stream conditions, but scattering fish are taken before and after these dates. When this fish first comes in from the sea it is in excellent condition for canning, and remains so for about a month; then it begins to deteriorate, the hump on the male growing rapidly, and the flesh becoming watery and poor. The average weight is from 3½ to 4 pounds. On account of the pale color the humpback is not in favor, and in fact is considered a nuisance in salmon districts, yet it is used for salt bellies, and makes up the pack on short runs of other species. In my opinion, it is an excellent fish and will only be justly appreciated when the redfish become scarce.

Dog salmon run from August 1 to October 1, and are not used in this section.

When the Hunter Bay cannery was built, in 1896, the field was comparatively new with the exception of the stream at Hetta, which had been fished for years by the Klawak cannery. The other streams supplied the Miller salteries, and as they were acquired by the Pacific Steam Whaling Company the field was clear. The fisheries were conducted entirely by the cannery fishermen with cannery gear, and the product was received at the cannery at very little expense. It is said that the output for 1896 paid largely for the plant. In 1897 some fish were purchased at the rate of $6 per 100 for redfish and 50 cents per 100 for humpbacks.

In 1897 the strong opposition of cannery interests brought a competitor into this field. During our visit a saltery was in process of construction in Hunter Bay by the Alaska Packers' Association, as a branch to their Loring cannery. It is on the southern shore of the bay, a mile from the entrance. The output in 1897 of salt fish from this establishment was 500 half-barrels of humpback bellies and 500 barrels of redfish and cohoes.

At Wrangell a gentleman connected with the customs service reported that a stream on Dall Island was tightly barricaded. He had passed by Hunter Bay while we were there, en route to Howkan on duty, and it was probably on this trip that he visited Dall Island.

The stream at Hetta probably offers a good locality for a hatchery for this section. There is a large supply of fish and plenty of water, which, however, would have to be tested for temperature. The drawback is that it is not accessible, being off the calling routes of steamers.

MOIRA SOUND—KEGAN.

From Nichols Bay, around Cape Chacon, on the eastern coast of Prince of Wales Island, no streams are fished for the canneries until Moira Sound is reached, the entrance to which is 24 miles northward of Cape Chacon.

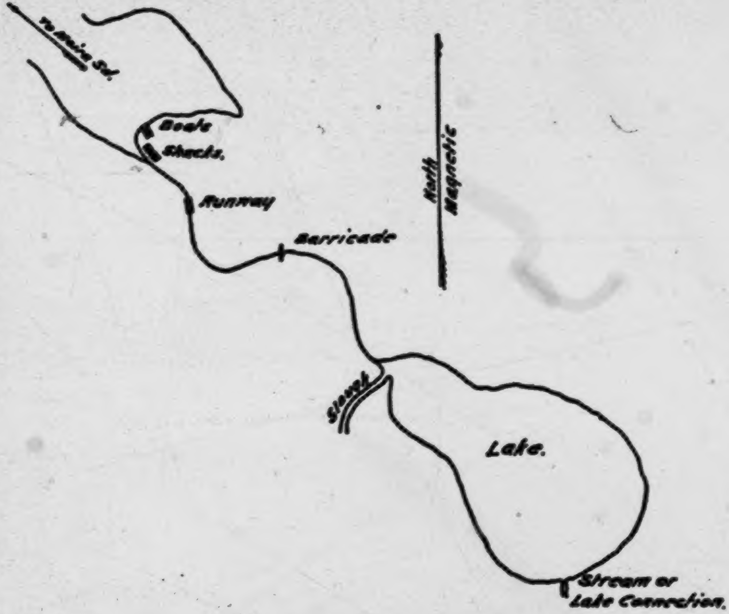
The stream called Kegan (the name of the Indian who claims it) empties into the western end, at the head of the first bay on the southern side of Moira Sound, about 3½ miles from Egg Island. The entrance to the bay is somewhat obstructed by islands and rocks. At the head of the bay, near the mouth of the stream, are several good seining beaches, and on the right bank, near the entrance, is a fisherman's house, a shack in which are stored seines and nets, two canoes, and a large seine boat.

The stream is a lake outlet, about 2 miles long, flowing in a general northwest direction. It has an average width of 30 feet between banks, and when visited was 3 inches deep over a 10-foot riffle. Immediately above high-water mark there is a runway 75 feet long, 8 feet wide at the lower end and 12 feet at the upper, constructed of stone and rails. Its use was evident, for on the banks four Indian traps were found constructed of split poles and withes, tubular in form, funnel-shaped at the lower end, about 15 inches in diameter, and at least 15 feet long, closed at the smaller end. They are no doubt used in the runway. Half a mile above this point are the remains of an old barricade, and 50 feet above this, where the stream passes

FISHING CAMP, SOUTH SIDE OF MOIRA SOUND.

A TRIBUTARY TO HETTA LAKE.

between two rocky points about 25 feet apart, is a barricade of more recent build, with portions of the central slats removed, probably by the action of the stream. It is constructed in the usual manner, with the top log about 5 feet above the surface of the water. The bottom, from the high-water mark to this point, is composed of fine gravel, continues coarser for half a mile, and is then rocky, with rapids and low falls, to the lake.



Sketch of Kegan Lake and Outlet.

The lake is about 40 feet above high water, about 1¼ miles long, and from one-fourth to one-half of a mile wide, and has a general northwest and southeast direction. The shores are heavily wooded and rocky, and the bottom around the mouth of the outlet is gravelly. On the southern side, near the outlet, a grassy slough, about three-eighths of a mile long and 50 yards wide, makes out from the lake. There were no means to make a thorough examination of the lake, but from the outlet the shore at the head looked as if it were grassy at the edge, with two streams entering, the main one coming from the southwest.

The following is the record of the salmon catch of this stream from 1892 to 1897, both inclusive:

Year.	Redfish.		Cohoes.		Humpbacks.	
	Dates.	Number.	Dates.	Number.	Dates.	Number.
1892	July 15 to Aug. 23	16,795	Aug. 5 to Aug. 23	191		
1893	July 25 to Aug. 30	10,265	Aug. 17 to Aug. 30	324	July 30 to Aug. 12	6,365
1894	July 13 to Aug. 23	18,739	Aug. 3 to Aug. 23	362		
1895	do	27,950				
1896	July 10 to Aug. 31	29,775	Sept. 5 to Sept. 9	384	July 27 to Aug. 21	5,446
1897	July 21 to Sept. 2	23,281	July 21 to Sept. 2	840	July 21 to Aug. 28	47,500

It seems that about 20,000 redfish can be taken from this stream annually. Until 1896 it supplied Metlakahtla exclusively; but Loring received 2,528 redfish in that year and 7,137 redfish, 250 cohoes, and 29,500 humpbacks in 1897.

There are no houses on Moira Sound having permanent occupants, and as no one could be found in the locality our work was somewhat retarded, the information previously obtained from the Indians being rather indefinite. We therefore explored all the streams, and by this time our parties were sufficiently expert to recognize the red-salmon streams by certain signs, whether the fish were running or not.

OLD JOHNSON STREAM.

The next redfish stream in the Moira Sound region is known as Old Johnson Stream. It empties into a V-shaped indentation on the northern shore of Moira Sound opposite the entrance of the bay into which Kegan Stream empties, 3½ miles in a straight line from Egg Island. This indentation opens into a very pretty basin, into the upper end of which the stream empties with a fall of a few feet. On the northern side of the basin, near the mouth of the stream, are two houses, in which were found seines and fishing gear, a canoe being housed near by; and on the same side, near the entrance to the basin, is a fishing shack. The general course of the stream is west-southwest. It is about a mile in length, and 30 feet wide between rocky and heavily wooded banks. It carries considerable water, with a strong current for the greater part of its course. Inside the mouth is an island, the stream widening out above, forming a cove on the left bank, which is crossed by a footbridge. Above this it contracts again, but at two other points it expands into shallows 150 yards wide. On the left bank, abreast the island, a tree has been felled across, and above the footbridge split rails and heavy gratings, 5 by 8 feet, were found, which, when applied to the fallen tree, would form a barrier.

The outlet at the lake is much obstructed by a natural barrier of drift. The lake was not examined, but judging from the flow at the outlet it must receive a large amount of water. It is approximately 4 miles long and 2 miles wide, with moderately steep, rocky sides. Two branches were noticed to the right and left, which may be entering streams connecting with other lakes, or they may embrace an island.

The following is the record of this stream for six years:

Year.	Redfish.		Cohoes.		Humpbacks.	
	Dates.	No.	Dates.	No.	Dates.	No.
1892	July 18 to Aug. 8	4,482	Not known	40	Not known	357
1893	July 22 to Aug. 15	4,119			July 25 to Aug. 25	15,329
1894	July 11 to Aug. 15	11,863			Aug. 6 to Aug. 15	4,083
1895	July 15 to Aug. 17	15,558			July 20 to Aug. 16	3,287
1896	July 8 to Aug. 21	10,798	Sept. 8	260	July 28 to Aug. 2	14,352
1897	July 19 tb Sept. 1	8,428	July 27 to Sept. 13	2,521	July 19 to Aug. 28	54,765

The fish from this stream went exclusively to Metlakahtla until 1896. In that year the Loring cannery received of the above catch 3,600 redfish, and in 1897, 3,434 redfish, 1,100 cohoes, and 38,000 humpbacks.

The capacity of the stream is about 10,000 redfish.

OTHER STREAMS OF MOIRA SOUND REGION.

On the long arm to the southward in Moira Sound, and about 2 miles from its head, on the eastern shore, is the mouth of a stream which, at the time of our visit, was very low. The distance from high-water mark to low-water mark is one-fourth of a mile. The stream between banks is from 30 to 50 feet wide, but the flow over a log was only 5 feet in width and 2 inches in depth. From appearances, in heavy rains, it carries a large amount of water, as it seems to drain a high mountain system. The stream is tortuous, but has a general west-by-south and east-by-north direction. For

WIDENING OF STREAM DRAINING LARGE LAKE, NORTH SIDE OF MOIRA SOUND.

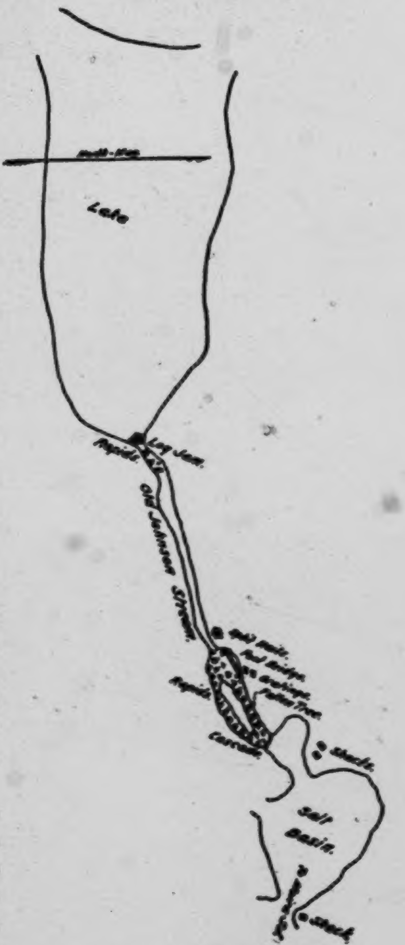
SPAWNING BEDS IN STREAM NEAR HEAD OF SOUTH ARM, MOIRA SOUND.

a few hundred yards at the mouth the banks are open and grassy and then heavily wooded. The bottom is of sand and gravel, the water spreading over it, with deep holes in places and very little current. It flows between two mountains, the northern being wooded to the top, the southern about 2,000 feet high and wooded to a height of about 500 feet; above this it was bare, with snow patches. The stream was examined for about three-fourths of a mile in a straight line, and no lake was discovered from a hill from which a view could be obtained. There were no barricades, except a few natural obstructions formed by fallen trees against which drift had found lodgment. The water is clear. About the mouth are excellent seining beaches. From the absence of fishing shacks and gear and barricades in the stream, and the clear water, it was concluded this was purely a humpback stream, and this supposition was afterwards confirmed by a Kasaan chief, Skowl, and cannerymen.

At the head of this southern arm of Moira Sound are two small brooks emptying into separate bights. The one to the eastward is a mountain stream flowing over a rocky bottom, and has its source in the vicinity of the bare mountain previously mentioned. This bight has, at its head, a fine gravel beach about half a mile long, bordered by a grassy bank 100 yards wide, with the heavy timber beyond. Moderately high hills surround the inlet.

The western stream flows into a similar bight, where there is a long gravel beach at low water. The shore is grassy, with salt-water pools through it. The bottom of the stream is rocky, and it has its source in the back hills. Both streams had very little flowing water, but as they drain a hill country, it is probable that they are greatly swollen during rainy weather. They are both humpback streams.

At the western extremity of Moira Sound are two inlets, the southern one having at its head a small brook running over a slaty bottom. The head of the arm and a large part of the northern beaches are gravelly. This is not a redfish stream, but probably contains humpbacks and a few cohoes.



Vicinity of Old Johnson Stream.

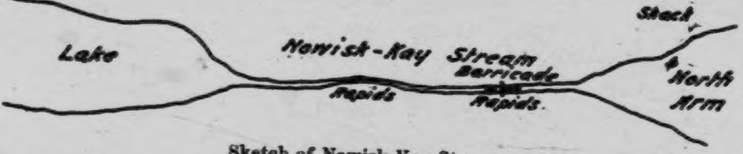
These are all the streams that enter Moira Sound, and the only ones that contain redfish are Kegan and Old Johnson. The cohoes and humpbacks credited to these two streams probably come, in part, from the other streams. It is the custom to establish fishing-camps on redfish streams and to fish all others in the vicinity for the different species.

NIBLACK ANCHORAGE.

Niblack Anchorage, between North Arm and Moira Sound, has a stream entering about midway on the northern shore behind a high-tide island which forms a part of the inner harbor. It is of large volume, about half a mile long and 30 feet between banks, and flows with considerable velocity over rapids and falls. No stream could be seen flowing into the lake at its head and the latter seems to be fed by cascades, one of which is quite large. The shores are for the most part precipitous, rocky, and inaccessible except by boat. The Kasaan Indians say that no redfish are taken here and there are no signs that it is a redfish stream. It is probable that salmon can not work their way over the falls and rapids.

NOWISK-KAY.

Nowisk-Kay is the name at present given to the stream which flows from the lake into North Arm. It is a little over a mile in length, averaging 30 feet in width by 18 inches in depth, and has a general east-and-west direction. An Indian of that name claims to be the owner of the stream. The bottom is rocky, covered with bowlders, and the banks are precipitous, rocky, and heavily wooded. About 500 yards from the mouth are the remains of a barricade—a tree had been felled, cut to make a tight fit in the rocky ledges on either side, and then supported in the usual manner. Most of the split rails had been removed or carried away by freshets, but a large number of poles or rails, such as are used for the top course of a barricade, were found near the bank, some of them newly cut. On the northern bank, near the barricade, were found two large rolls of wire netting, apparently recently placed there. With these means at hand it is probable that two men in a day's work could have effectually barricaded the stream.

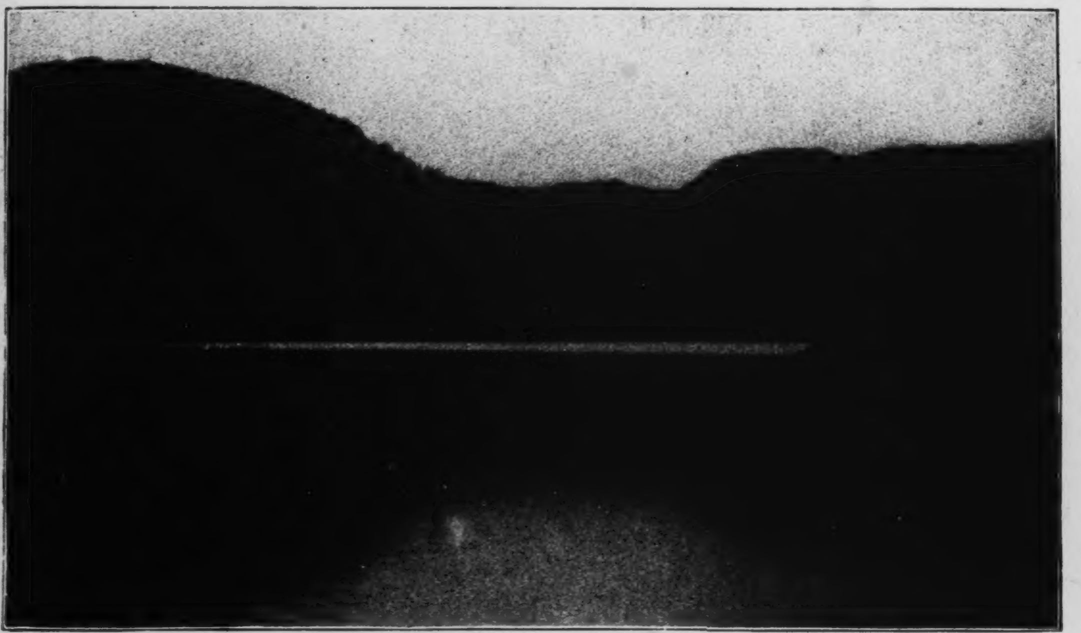


Sketch of Nowisk-Kay Stream.

There were no means available to examine the lake. From the head of the outlet all that can be seen is an arm about 2 miles long and 200 to 300 yards wide, which is probably the connection with the lake proper. It is about 20 feet above the sea level, has steep, rocky banks, and appears deep. Judging from its flow at the outlet it must receive a large body of water, either from inflowing streams or other lake connections.

The following is the fishing record of Nowisk-Kay Stream for six years:

Year.	Redfish.		Cohoes.		Humpbacks.	
	Dates.	No.	Dates.	No.	Dates	No.
1892	July 13 to Aug. 6	3,168			July 29 to Aug. 6	2,965
1893	July 31 to Aug. 31	6,671	Aug. 17 to Aug. 31	200	July 28 to Aug. 16	10,485
1894	July 14 to Aug. 23	8,346	July 10 to Aug. 23	1,002	July 30 to Aug. 9	808
1895	July 16 to Aug. 15	14,053			July 26 to Aug. 1	772
1896	July 15 to Sept. 5	12,885	Not known	102	July 27 to Aug. 21	11,864
1897	July 19 to Aug. 30	36,934	July 19 to Aug. 30	595	July 22 to Aug. 19	7,771



LAKE NEAR NIBLACK ANCHORAGE. VIEW UP LAKE.

CASCADE IN STREAM DRAINING LAKE NEAR NIBLACK ANCHORAGE.

The fish from this stream were supplied exclusively to Metlakahtla until 1896. In that year Loring received of the above catch 1,000 redfish, and in 1897 about half of the catch, except the humpbacks. The catch seems to be increasing in recent years, possibly from more vigorous fishing. It probably yields 15,000 redfish annually.

PETER JOHNSON STREAM.

The small inlet on the north shore of Point Adams was visited by portage from North Arm, but no stream was found. After leaving the locality it was learned that a red-salmon stream is located on the inlet. It is known as the Peter Johnson Stream, and will be the subject of a future examination. The fish from this stream are very small. The record for six years is as follows:

Year.	Redfish.		Cohoes.		Humpbacks.	
	Dates.	No.	Dates.	No.	Dates.	No.
1892	July 8 to Aug. 18	8,434	Aug. 6 to Aug. 18	1,310	....	
1893	July 10 to Aug. 29	17,154	....		Aug. 5 to Aug. 15	1,754
1894	July 18 to Aug. 23	15,525	July 25 to Aug. 23	2,329	....	
1895	July 6 to Aug. 16	17,874	July 26 to Aug. 20	1,979	July 24 to Aug. 2	1,465
1896	July 8 to Aug. 2	21,700	——— to Sept. 10	1,900	Aug. 3 to Aug. 21	8,000
1897	July 6 to Sept. 2	26,310	July 19 to Sept. 9	2,957	July 20 to Aug. 21	10,016

The above-mentioned fish were supplied exclusively to Metlakahtla until 1896. Loring received 6,300 redfish in that year, and 10,169 redfish and 1,500 humpbacks in 1897. The average catch of redfish, as indicated in this record, is 17,833 per year. It is believed, however, that the stream can produce at least 25,000, and a conservative estimate would be 20,000.

All these streams, from Kegan to Peter Johnson, are known as the Moira Sound streams, and are fished by the Indians claiming them, the product being sold to the canneries, except in the case of Loring. This cannery has purchased fish and sent fishing gangs to the locality. Drag seines are used in making the catch.

Reference has previously been made to the great difference in the weight of fish in different streams, and Moira Sound offers a striking example. The redfish from Kegan average about 5 pounds, those from Old Johnson, on the opposite side of the sound, run 6 pounds, and from Nowisk-Kay 7 pounds, the largest in the locality, while those from Peter Johnson run 3½ to 4 pounds, the same as the Metlakahtla home stream and Tamgass Harbor. These are probably the smallest redfish in Alaska except those from Necker Bay, Baranof Island.

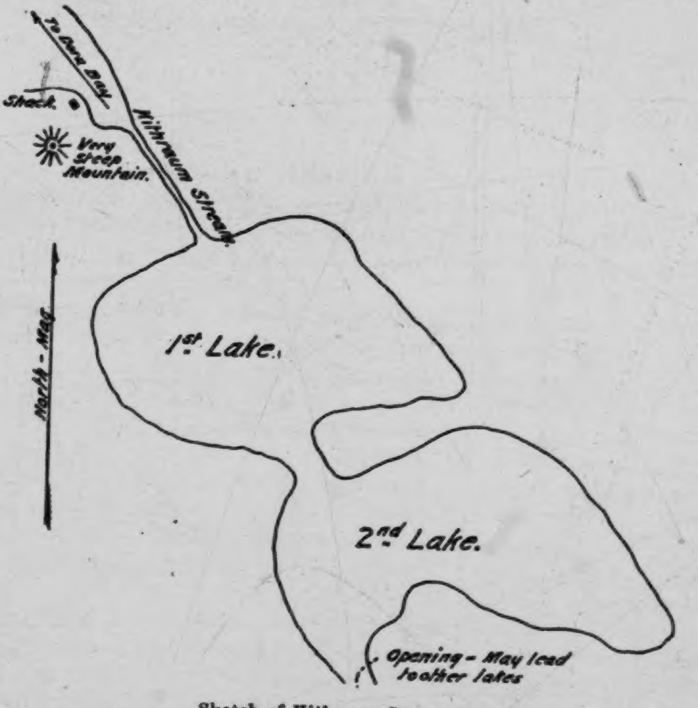
No reference has yet been made to the availability for hatchery purposes of the Moira Sound streams. At all the redfish streams fish, which could be easily corralled until ripe, are abundant and plenty of water can be obtained by gravity. The locality is inaccessible, being off the steamer routes; but the only real questions are the necessity of filtering the water and the range of temperature of water during the hatching season. As previously remarked, all the redfish streams in southeast Alaska have discolored water, and wherever lake water is used for hatchery purposes it should probably be filtered. A series of observations would be necessary to determine the suitability of the waters as regards temperature. The sun during the summer, when it does shine, warms the surface water considerably, and on being conveyed down a shallow stream the temperature is further increased.

CHOLMONDELEY SOUND AND KITHRAUM STREAM.

Cholmondeley Sound is the next body of water to the northward. Here there is but one red-salmon stream, those entering the heads of the other arms and inlets carrying only a few cohoes, humpbacks, and dog salmon.

Kithraum Stream flows into the head of the narrow inlet about 2 miles long that makes to the southward and eastward of Dora Bay, Cholmondeley Sound. It is about half a mile long and 15 feet wide, flowing with a strong current in a general northwest direction from a lake of which it is the outlet. The bottom and banks are rocky, and from its general appearance a large amount of water is discharged during the rainy season.

The outlet at the lake is badly choked by drift. No evidences of barricading were found. There are two lakes, each about a mile long and a half to three-quarters of a mile wide. The first is joined to a second by a passage about 60 yards across and extending in a general southeast and northwest direction. The lakes are surrounded by high, snow-covered mountains. The second lake has an outlet or wide passage at its southwest end, which was choked and prevented further examination in the very small canoe at our service. There was also a heavy jam of timber in the connecting passage. The inlet in the southwest end may lead to a third lake or receive an entering stream, but nothing could be seen. The waters of the lakes



Sketch of Kithraum Stream.

PLATE 33.

LAKE NO. 1, DORA BAY, LOOKING TOWARD OUTLET.

PLATE 34.

LAKE NO 2, DORA BAY, LOOKING TOWARD NO. 1.

appeared deep and were slightly discolored. At the mouth of the stream were two shacks and some fishing gear. The fish are sold to Metlakahtla.

The records for three years are as follows:

Year.	Redfish.		Cohoes.		Humpbacks.	
	Dates.	No.	Dates.	No.	Dates.	No.
1894	July 17 to Aug. 18	6,972	Aug. 4 to Aug. 14	281	Aug. 4 to Aug. 11	9,810
1896	July 8 to Aug. 22	5,695	(Dates not known)	44	July 28 to Aug. 30	8,914
1897	July 19 to Aug. 27	9,000	Aug. 17 to Aug. 27	600	July 21 to Aug. 21	3,800

The average catch is 7,222 redfish, and the stream could probably supply 8,000 per year. The stream is claimed and fished by an Indian, Kithraum.

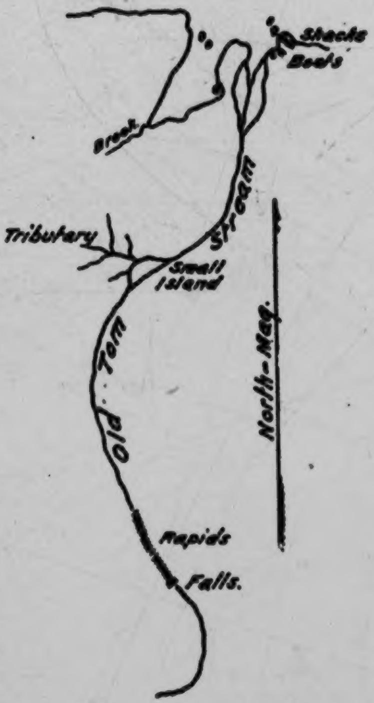
From Nichols Bay to and including Cholmondeley Sound there seemed to be no permanent dwellings.

SKOWL ARM AND OLD TOM STREAM.

We next came to the territory fished exclusively for Loring, and including Skowl Arm, Karta Bay, and Kasaan Bay Stream.

Skowl Arm has two redfish streams, neither producing a large number.

Old Tom Stream has its mouth at the head of the first bight immediately west of the first, long deep inlet opening into Skowl Arm from the southward. It is opposite Kasaan village. The stream enters the eastern side of the bight, where a small inlet is formed, having a narrow entrance and opening out into a grassy flat one-fourth of a mile long and one-eighth of a mile wide. High water extends about 200 yards above the entrance. In the small inlet there are good gravel seining-beaches. At the mouth of the stream on the right bank are two shacks, a smokehouse, a canoe, seine boat, fish float, and some fishing gear. There were no evidences of barricading in the stream, which is tortuous, and has a general north-and-south direction. For 1¾ miles the bed is fine sand and gravel, with rocky riffles. Its width diminishes from 30 feet to 15 feet, and it rises about 20 feet in the distance named. Then for three-eighths of a mile it runs as a rapid over a rocky bed, at the end of which is an almost perpendicular fall of about 20 feet, with a deep pool below. The fall in this reach is about 40 feet. For half a mile above the fall the stream diminishes rapidly in volume and runs over a rock and gravel bottom. Considerable water drains from the western side, which is an open grassy and wooded slope. On the eastern side the mountains come to the bank of the stream. About halfway up, the stream, in running over a log, was noticed to be 10 feet wide and 2½



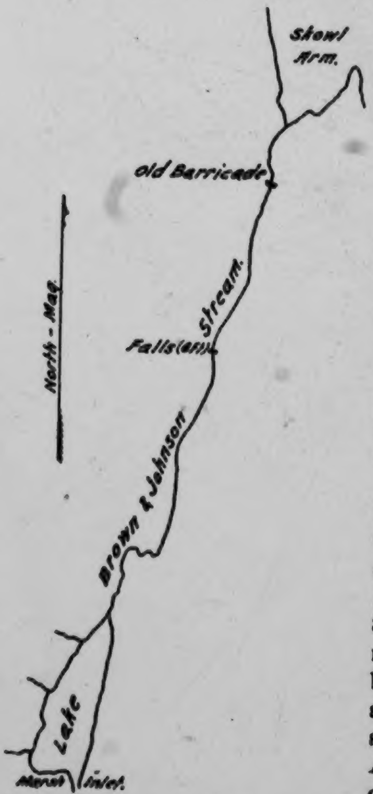
Sketch of Old Tom Stream.

inches deep. In several places there are natural obstructions formed by drift. About a mile from the mouth it receives from a grassy flat filled with pools a small tributary on the left bank. This tributary was examined for one-fourth of a mile in a general westerly direction and found to be simply a rill flowing between pools, with grassy banks about 5 feet apart. The bottom generally was sandy, with vegetable sediment in the pools. The water is dark, and discolors the main stream, which above is clear.

The only records of Old Tom Stream available are for 1896 and 1897, and are taken from the cannery books at Loring:

Year.	Species.	Dates.	Number.
1896	Redfish	July 27 to Aug. 14	2,310
	Cohoes	Sept. 1 to Sept. 16	1,925
1897	Redfish	July 20 to Aug. 21	3,000
	Cohoes	Sept. 1 to Sept. 10	600

The Indians state that in 1896 about 4,000 redfish were taken from this stream, and that the tributary is a lake outlet. The party examining it found no lake, unless the pools and shallows form a lake during the rainy season. The annual yield of the stream is probably about 3,000 redfish, averaging 5 pounds in weight.



Sketch of Brown & Johnson Stream.

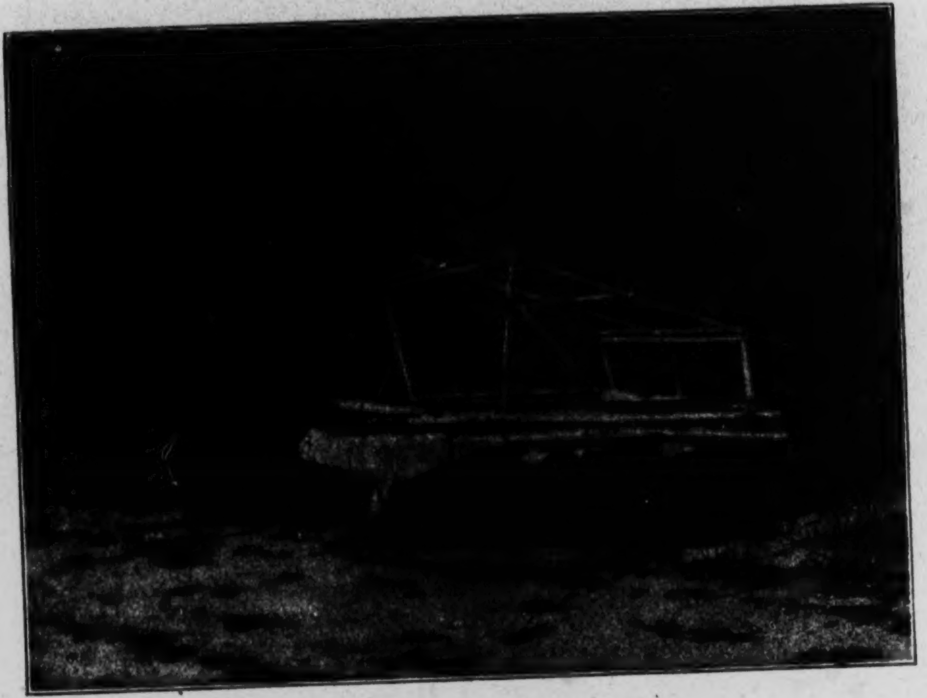
BROWN AND JOHNSON STREAM.

On the western shore of Skowl Arm, where it bends to the southward, and opposite the northern end of a large island, is the mouth of the Brown & Johnson Stream. It is about 1½ miles long, 30 feet wide, and rises about 50 feet above high water to the lake of which it is the outlet. It flows in a general north-northeast direction from the lake, with a strong current, over a bottom which is generally rocky and bowldery, but in some places sandy and gravelly. It is comparatively free from natural obstructions.

A few hundred yards within the mouth are the remains of a barricade of the usual construction. The central poles have been removed or carried away, but could easily be replaced. About halfway up, the stream falls in a cataract 8 feet high. The lake is approximately half a mile long by 400 yards wide. It lies in a marshy basin, though the center seems deep and there are some sloping sandy beaches. It is fed by small streams, with sandy and gravelly bottoms. At the head is a narrow inlet, but on account of having no facilities at hand it could not be examined. It may connect with another lake or with an entering stream. The volume of water at the outlet indicates there must be some large feeder.

The only available records of this stream are from the cannery books at Loring:

Year.	Species.	Date.	Number.
1896	Redfish	July 27 to Aug. 14	2,310
	Cohoes	Sept. 1 to Sept. 16	1,925
1897	Redfish	July 30 to Aug. 16	1,770
	Cohoes	Aug. 23 to Sept. 3	700



Skeleton of the floating fish-house at Skowl Arm.

Brown & Johnson Stream should produce about 2,000 redfish per year, all of which go to Loring. The average weight of the fish is about 5 pounds.

There are other salmon streams at the ends of the arms making to the southward from Skowl Arm, but they contain only cohoes, humpbacks, and dog salmon. The village of Kasaan is situated on the northern shore of Skowl Arm, 3 miles within the entrance and out of the steamer track. Some of the old houses remain and many interesting totem poles may be seen.

KARTA BAY.

Karta Bay is at the northwestern end of Kasaan Bay (called Kasan Bay on Chart A), of which it forms a part. The saltery on the cove directly east of Karta Bay proper, known as Karta Bay or Baronovich Fishery, was one of the first operated in southeast Alaska. A redfish stream empties into the head of Karta Bay about a mile from the saltery. A Greek, or Slav, Baronovich by name, many years ago married the daughter of Skowl, one of the old-time chiefs of the Kasaans, and received from him this fishery, which has been one of the most productive in southeast Alaska. Baronovich lived at the saltery, where he packed fish (about 400 barrels a year), kept a store, and traded with the Indians. He died some years ago. The saltery, wharf, store building, and several houses are still standing, but all are deserted. Baronovich's sons, who during our visit were there to conduct the season's fishing, were housed in shacks in a bight on the eastern shore of Karta Bay proper.

For a number of years the Cutting Packing Company, then operating the cannery at Loring, leased the stream, paying $300 a year to the widow of Baronovich, but in 1893, when the cannery passed into the hands of the Alaska Packers' Association, the lease was relinquished. The run of 1892 was so small that it did not warrant the cannery in holding the stream. On account of the low price of salt fish, the saltery has not been in operation, except in a desultory way, for a number of years. The Baronovich sons have still about 100 barrels of a lot salted at a loss a few years ago. This year (1897) they salted 41 half-barrels of humpback bellies.

It appears that one of the first chiefs of the Kasaans, Sanhite (Billy Wilson), also has Indian fishing rights in the Karta Bay stream, and, with his fishing crew, conducts a separate fishery. He has a large house at Kasaan, but during the summer season lives in the Indian village at the mouth of the stream, where there are about a dozen houses and shacks.

It is said that during the lease of the stream by the Loring cannery it was barricaded, and that an Indian was paid $2 a day to keep the barricade perfectly tight. The cannery people say that the fencing was done by those claiming the fisheries. It is also said that on account of the rapid decrease of salmon the barricade was removed in 1892, which explains the big run in 1896; in 1893 the stream was closed, and a small run in 1897 was expected. The stream has been open since 1893.

At Loring it was positively stated that the Karta Bay stream was barricaded in 1892, that it was open in 1893 and 1894 and very little fishing done, and was probably closed in 1895.

In 1896 the cannery steamer took to Loring from this stream 84,545 redfish. Of this number Baronovich Brothers sold about 47,000, and Sanhite about 37,000. The price paid was $5.50 per 100. The fish are said to be of a large variety and to run 7 pounds in weight during the season. At the time of our visit about 100 redfish were taken at one haul; 25 of these averaged 6½ pounds, the largest 9 pounds, the smallest 5 pounds. The Indians state, however, that the first fish are always small and that they average much higher as the run increases.

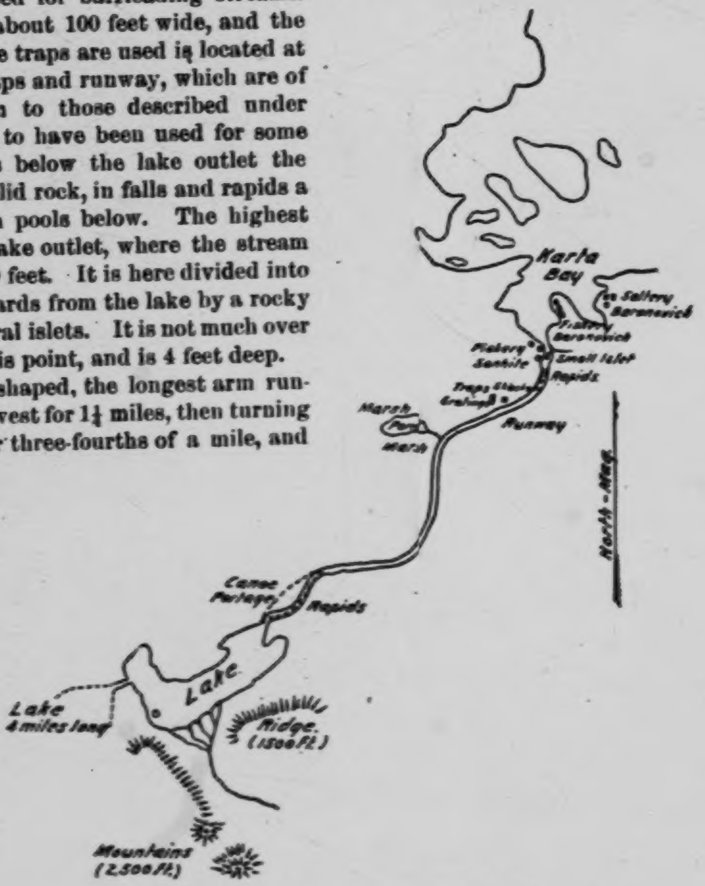
KARTA BAY STREAM.

Karta Bay Stream is said to have perhaps the earliest run of redfish in southeast Alaska. Fishing has commenced here on June 4, though that was an exceptionally early date. In 1897, on June 13, some salmon having been seen jumping, a haul was made and 100 redfish were taken. No other haul was made until June 25, when 600 were taken and sent to Loring. It is a great, wide, beautiful stream, with a large volume of water that comes tumbling down over the rapids with considerable velocity, and is more worthy of the name of river than the streams previously visited.

LAKE NEAR KARTA BAY.

The bed of the stream is rocky, interspersed with bowlders and coarse and fine gravel. The banks are rocky and precipitous and covered with heavy undergrowth. Mountains impinge close on the banks. From the Indian village the general course of the stream is to the southwest, and, with its meanderings, it is about 4 miles to the lake, the distance in a straight line being about 3 miles. It varies from 100 to 300 feet in width. About one-fourth of a mile from the mouth is an Indian shack in ruins, and stored inside were a number of Indian traps and large gratings, which, in some places, are used for barricading streams. Here the river is about 100 feet wide, and the runway in which the traps are used is located at this point. The traps and runway, which are of similar construction to those described under Kegan, appear not to have been used for some time. For 2 miles below the lake outlet the stream runs over solid rock, in falls and rapids a few feet high, with pools below. The highest rapids are at the lake outlet, where the stream drops 12 feet in 150 feet. It is here divided into two parts for 100 yards from the lake by a rocky ledge forming several islets. It is not much over 20 feet across at this point, and is 4 feet deep.

The lake is L-shaped, the longest arm running southwest by west for 1¼ miles, then turning north-northwest for three-fourths of a mile, and is from one-fourth to one-half mile wide. Near the end of the arm a narrow inlet communicates on the same level with a second lake, which is said to be 4 miles long and from 1 to 1½ miles wide, with a number of inflowing streams. The first lake has one stream emerging from a valley between two snow-capped mountains near the southern shore of the upper arm, and entering the lake from a large, sparsely wooded flat, in a dozen or more streamlets having grassy banks and fine gravel and sand bottom. These streamlets cover about three-eighths of a mile of the lake shore. The central part of the lake seems deep, though there are a few shoals, one appearing at the surface; along the shores it is shallow. The banks are mostly grassy, with sand and gravel beaches. The lake is about 60 feet above the level of the sea, and the stream falls 30 feet in the first half mile.



Sketch of Karta Bay Stream.

This seems an excellent locality for a hatchery, as there is a harbor, abundance of water by gravity, plenty of fish, and at the mouth of the stream a natural basin that could be easily arranged for holding fish until ripe.

The records of Karta Bay Stream are incomplete. The following is all that could be found. The first date, July 3, 1897, is not the date of the first fish taken, but the date when the cannery began operations. The first fish taken were on June 13, and 600 were sent to the cannery on June 25.

Year.	Species.	Dates, etc.	Number.
1888.	Redfish	In June (first on the 20th).	2,178
	Do	In July	22,760
	Do	In August, to 25th.	5,082
		Total	[*]30,020
	Cohoes	From Aug. 10 to Sept. 7.	[*]1,739
1889.	Redfish	In June (first, 670 on the 26th).	2,176
	Do	In July	9,542
	Do	In August, to 17th.	2,499
		Total	14,217
	Cohoes	From Aug. 17 to Sept. 16.	6,027
1890.	Redfish	In June (first, 2,995 on the 21st).	17,223
	Do	In July	23,415
	Do	In August, to 4th	2,150
		Total	42,788
	Cohoes	No record.	
1891.	Redfish	In June (first, 4,250 on the 18th).	21,012
	Do	In July	47,864
		Total	68,876
	Cohoes	No record.	
No record whatever could be obtained for 1892, 1893, and 1894. The run in 1892 was very small, and in 1893 and 1894 very little fishing was done.			
1895.	Redfish	July 13 to 3[illegible]	5,631
	Cohoes	August 1 to 18	1,826
[†]1896.	Redfish	In June (first on the 20th).	7,258
	Do	In July	71,837
	Do	In August, to 14th.	5,450
		Total	84,545
1897.	Redfish	From July 3 to Aug. 16.	23,000
	Cohoes	From Aug. 26 to Sept. 17.	2,500
	Humpbacks.	From July 27 to Aug. 16.	36,000

[*] These fish made 3,343 cases, Naha Brand, redfish and cohoes packed together; 9 to the case, or an average weight of over 7 pounds.

[†] The catch of redfish from this region in 1896 was a surprise to every one acquainted with the subject, notwithstanding that this was a remarkable year in southeast Alaska.

It is generally believed that Karta Bay will, under average conditions, yield 35,000 redfish per annum, and, if kept free from barricades, there seems no reason why that number should not be doubled in the future.

KINA.

There is another small stream in Kasaan Bay, which has a small run of redfish. It is known as Kina, and empties into the bight next west of Coal Bay. All the fish go to Loring. The stream might supply 2,000 redfish annually. The only record available is as follows:

Year.	Species.	Dates.	Number.
1896	Redfish	July 29 to Aug. 23	2,018
1897	do	July 19 to Aug. 16	1,500
	Cohoes	Aug. 8 to Sept. 4	470
	Humpbacks	July 19 to Aug. 16	15,000

At the head of Twelve Mile Arm, and on the western shore, are streams containing cohoes or humpbacks, or both; but the Karta Bay and Kina streams are the only ones in Kasaan Bay and its branches that have redfish.

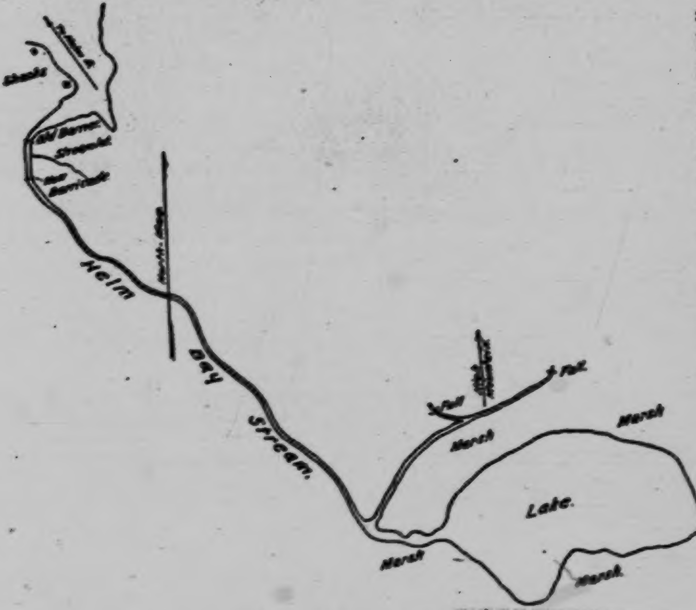
In July, 1889, the Loring cannery received from Kasaan Bay, from July 27 to September 16, 1,304 redfish and 5,219 cohoes, paying 8 cents each for redfish and 14 cents each for cohoes.

FISHING HUTS ON SKOWL ARM, KASAAN BAY.

STREAM AT DORA BAY, LOOKING OUT.

HELM BAY.

Helm Bay opens into Behm Canal from the southeast part of Cleveland Peninsula. A small redfish stream empties into the V-shaped indentation on the northern shore of the bay, about midway of its length. At the time of our visit it discharged very little water. It has a general northwest-and-southeast direction, is from 1½ to 1¾ miles long, with sandy and gravelly bottom, and is about 15 feet wide.



Sketch of Helm Bay Stream.

The lake is about 50 feet above high water, and 1 mile long by ½ to ¾ mile wide. The banks are marshy, and the bottom appears sandy, sloping gradually from the banks to the center. Besides the tributary mentioned as entering between the two barricades, the main stream receives from the eastward another on the right bank, a little below the lake outlet. This tributary forks, each branch leading to a small fall.

On the point forming the bight is a rude shack in which were stowed some seines, and on the beach a flatboat was found. Within the mouth, and about the point reached by high water, are the remains of a barrier from which nearly all of the poles have been removed, but which would need only very little work to make it effective. A short distance higher up, above the mouth of a small tributary, is a barricade of recent construction, nearly intact, and lacking only two poles in the center to make it effective. Twine netting, badly damaged, was also found here, and was probably used in the construction of the barricade.

The following, the only record obtainable, is taken from the cannery books at Loring, where these fish are brought by the Indians who conduct the fisheries:

Year.	Species.	Dates.	Number.
1896	Redfish	July 13 to 31	2,900
	Do	Aug. 1 to 11	3,601
	Cohoes	Sept. 1 to 15	1,931
1897	Redfish	July 21 to Aug. 11	6,000
	Cohoes	Sept. 1	700

Helm Bay Stream should produce 6,000 redfish annually.

At the head of the bay is a humpback stream which was examined. Its high-water mark is on line with the edge of the timber, half a mile beyond the low-water mark. Between the two the upper part of the northern side is grassy, while the southern is rocky. From the latter, several streams enter which during high water fall, by cataracts about 30 feet high, into the bay, and at low water have their own beds and join the main stream, doubling its volume. The stream is from 20 to 30 feet wide between banks; has much sand and gravel on the bottom, making good spawning-beds for humpbacks, and is much choked by drift timber. At the time of our visit the water was low; across a riffle, 8 feet wide, it was only 4 inches deep. The banks are quite level and heavily wooded and the water is clear. As it was early learned that this was not a redfish stream, the headwaters were not examined. At the head of the bay on the northern side are good seining beaches.

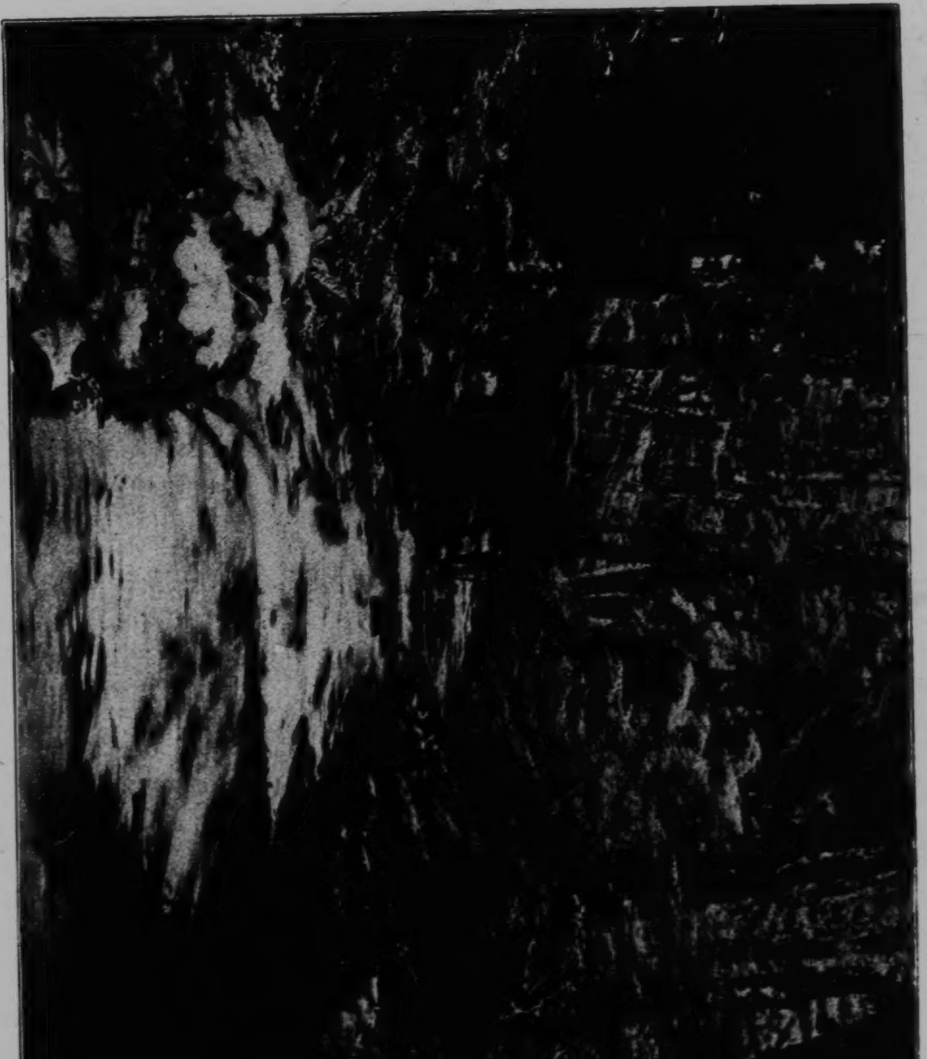
NAHA BAY.

Naha Bay, an arm of Behm Canal, is on the western side of Revillagigedo Island opposite Helm Bay, and 10 miles within the southern entrance of the canal. Loring is a post-office, and is situated on the northern shore of Naha Bay. In 1890 it had a population of 200, which must have included the cannery-hands (Chinese and others), as the permanent population is very small. At the head of the bay a lake or lagoon receives the waters of the home salmon stream (Naha Stream), which formerly was so prolific that the Indians, in speaking of anything and desiring to express large numbers, would liken it to the salmon in Naha Stream. The cannery buildings, wharf, store, etc., are on the eastern point of a small cove on the northern shore, and circling this cove are the dwellings of the whites and others.

The cannery belongs to the Alaska Packers' Association, and in 1897 it had the largest output of any cannery in Alaska (62,040 cases), though the pack consisted largely of humpbacks.

A saltery was in operation here for many years prior to 1888, when the Alaska Salmon Packing and Fur Company, of San Francisco, built a cannery which was operated by the Cutting Packing Company. A pack has been made here every year since. In 1892 it joined with other canneries under the Alaska Packing Association, and in 1893, when the Alaska Packers' Association was formed, it joined that organization and has since been operated by it. The cannery originally had a capacity of about 400 cases per day. This by better methods was increased to 700, and in 1896 it was again enlarged and now has a capacity of 1,800 cases per day.

The cannery obtains fish from the home stream (Naha), Karta Bay, Kasaan, Union, and Helm bays, Moira Sound district, Quadra, Checats, and Ketchikan. The stream records are given under the proper headings, so far as they could be obtained, but the totals by streams will not give all the fish used, because in each district there are streamlets from which a few hundred, perhaps a thousand, are taken by the Indians and carried to the passing steamers or to the canneries. For instance, the total number of redfish used at Loring in 1896, as recorded by streams, is 207,732, while the number actually used was 216,000. With cohoes and humpbacks there are still greater differences, as cohoes are very much scattered and only a few are taken here and there, while the humpbacks run in such numbers and are so cheap that not much attention is paid to them, so far as districts are concerned. These fish can therefore only be referred to by localities in a general way, except when taken from a regular fishery.



STREAM AT HELM BAY.

In 1896 the Loring cannery obtained from various localities and packed 27,000 cohoes between August 5 and September 15, many of which are recorded under the streams described. The total number of humpbacks used at the cannery the same year was 784,263, of which number 361,738 were supplied by the home stream between July 18 and August 31 and 148,258 by Ketchikan between July 24 and August 31.

The following shows the packs of Loring cannery for 1896 and 1897:

Species.	1896.			1897.		
	Date.	Number of cases packed.	Number of fish per case.	Number of fish.	Number of cases packed.	Number of fish per case.
Redfish	June 19 to Aug. 31	19,621	11	131,567	10,470	11.8
Cohoes	Aug. 5 to Sept. 15	3,029	9	19,478	2,306	8.4
Humpbacks	July 18 to Aug. 31	38,365	20 to 21	1,124,610	49,264	23.0
Dog salmon	July 18 to Aug. 6	452	6½	....	....	....
Total	....	61,467	....	....	62,040	

NOTE.—This cannery is also credited with the following salt salmon in 1897: 216 barrels redfish, 324 barrels cohoes, and 1,449 barrels humpback bellies. No salmon were salted at Loring; these were simply received at the cannery for shipment.

It is impossible to give detailed weights of fish from each stream. The averages to the case are the general averages of all of each species coming to the cannery. The redfish from Naha Stream weigh about the same as from Quadra, 8 pounds; Karta Bay, 7 pounds; Kasaan, 5 pounds. The fish from Moira Sound average 6½ pounds, except the Peter Johnson fish, which run from 3½ to 4 pounds. The average weight of the cohoes packed here also varies slightly from year to year, depending somewhat upon the localities from which the fish are received, the waste, and local consumption. These averages are derived by dividing the number of fish received by the cases packed; hence, if the waste or consumption is large, the average is raised.

The prices paid for redfish in 1896 were from $4 to $6.50 per 100, for cohoes $6 per 100, and for humpbacks from 50 to 75 cents per 100. As the average weight of fish from each stream is fairly well known, the price from the different streams is agreed upon at the beginning of the season. For instance, the fish from the Peter Johnson Stream being small, less is paid for them than for those from Karta Bay. The prices in 1897 ranged from $4.50 to $8 per 100, depending upon delivery at the cannery or at the fishery, amount of gear furnished by the cannery, and size of fish. The higher rate, $8, was paid where the competition was close, and in one place the rate was raised to $10. Cohoes commanded about the same price, and humpbacks from $6 to $7.50 per 1,000. Where a large number of these fish could be guaranteed and no gear was furnished, the latter price was paid under contract.

The cannery fishermen's contract was $45 per month and board from the time of leaving San Francisco until the return of the vessel.

The contract price with the Chinese was 40 cents per case for packing.

In 1896 the cannery employed, or bought fish from, 50 white and 75 native fishermen. In the cannery proper were employed 130 Chinese, 6 whites, and 15 to 20 native women ("klootchmen") to assist the Chinese during the busy season.

In 1897, 20 white and 175 native fishermen were employed, and the cannery help consisted of 7 whites, 25 native women, and 130 Chinese.

The cannery has 2 steamers. The *Arctic*, of 21 tons, with a crew of 5, is valued at $12,000. The *Novelty*, of 34 tons, with a crew of 5, is worth $12,000. Attached to the cannery is the bark *Electra*, of 940 net tons, and valued at $12,000. This vessel carries the hands and the cannery outfit for the season from San Francisco in the spring. It is met at Dixon Entrance by one of the steamers and towed to the cannery, where it is tied up to the wharf for the summer. When the pack is finished the bark carries the hands back, and also the pack, or so much of it as can be handled. The crew of the *Electra* are fishermen and are so employed after the vessel reaches her destination, the officers taking charge of the cannery steamers, acting as watchmen, etc. In 1897 an extra vessel, the *Nicholas Thayer*, of 556 net tons and valued at $10,000, made two trips to assist in carrying the pack.

On the fishing-grounds and at the cannery are 29 lighters and fish-scows valued at from $50 to $100 each, and 21 seine boats valued at $50 each.

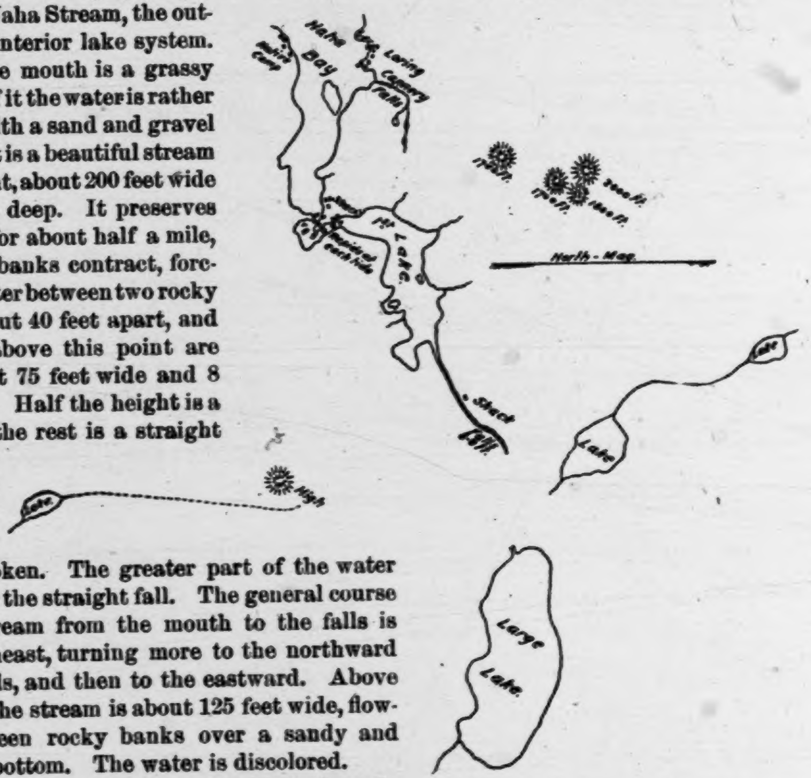
In 1896 the fish were all taken in 21 drag seines, varying in length from 75 to 250 fathoms, and valued at $1.50 per fathom. The seines were practically the same in 1897, though of the 21 only 7 were used by the cannery fishermen, as follows: Three, 150 fathoms long, 200 meshes deep; one, 125 fathoms long, 200 meshes deep; two, 100 fathoms long, 130 meshes deep; one, 75 fathoms long, 200 meshes deep. The others were used on the independent fisheries supplying the cannery. It is difficult to give accurate statistics of seines, not only on account of the independent fisheries supplying the canneries, but because every cannery has usually a number in reserve and a large amount of web, floats, etc., ready to be made up. The standard mesh for the Alaska fisheries is 3-inch stretched, and this usually takes the form of 2½-inch in the bunt, 3-inch in the quarters, and 3½ to 4 inch in the wings.

NAHA STREAM.

Upon arrival at Loring inquiry was made at once in reference to this stream and its lake system. The only information obtainable was that the stream was of considerable length, flowing through a very rough and rugged country, and was the outlet to a chain of lakes, some reports said two, others as high as seven. No one could be found, however, who had explored the region or who could give definite information. It was decided that an examination of the lower course of the stream and a view of the lake basin from a mountain top was all that could be attempted. Accordingly, a party ascended a mountain a little over 1,700 feet high, back of the cannery, and took photographs and bearings of the lake basin, estimating distances of prominent features. It is probable that all these lakes indicated on the sketch communicate with each other or with the outlet.

Upon leaving the cannery for the stream, a small wooded island, connected with the shore at low water, is passed, and continuing to the eastward about a mile the head of the bay is reached. The bay here narrows to a passageway (which turns about 180° to the northward around a sharp projecting point) connecting the head of the bay with the first lake or lagoon. On the inner side of this passage, and on the western shore, is an old saltery, now used for storing boats and fishing gear. The bottom of this passage is rocky, and rises in such a manner that on both tides it forms rapids, making slack water only when the tide is within about 2 feet of ordinary high water, so that the current usually flows out. This body of water may be termed the "first lake." The water was found practically fresh at all stages of the tide. The water that flows in during the last of the flood can only be slightly brackish, for the large discharge keeps the water brackish in the upper part of the bay, and the amount that flows in forms only an inconsiderable portion.

This lake is about a mile long by one-fourth of a mile wide, with a depth of from 6 to 18 fathoms, with a muddy bottom. The banks around the western and southern shores are rocky. On the northern shore three small draining streams, only a few feet in width, enter. They run from the mountain for about one-fourth of a mile to the lake over a comparatively level bottom of sand and gravel. They flow into bights where it is marshy or grassy, and at this point the lake is shallow along the shore, with mud and sandy bottom. A large stream enters the southern side near the eastern end, where there is a large grassy flat. At the eastern end, near the northern shore, is the mouth of Naha Stream, the outlet of the interior lake system. Around the mouth is a grassy flat, and off it the water is rather shallow, with a sand and gravel bottom. It is a beautiful stream at this point, about 200 feet wide and 2 feet deep. It preserves its width for about half a mile, when the banks contract, forcing the water between two rocky points about 40 feet apart, and 200 feet above this point are falls about 75 feet wide and 8 feet high. Half the height is a cascade; the rest is a straight fall on one side, while upon the other it is partly broken. The greater part of the water flows over the straight fall. The general course of the stream from the mouth to the falls is east-northeast, turning more to the northward at the falls, and then to the eastward. Above the falls the stream is about 125 feet wide, flowing between rocky banks over a sandy and gravelly bottom. The water is discolored.



Naha Bay and Lakes.

This salmon stream, one of the best in southeast Alaska, has suffered through the use of barricades. Until 1893 it was so solidly closed that it did not seem possible for a fish to pass through. That year the barricade was removed, and the stream has remained open ever since. Whether the stream was ever barricaded at the mouth of the outlet, near the eastern end of the lake, could not be ascertained. The barricade of 1893 and the earlier ones were placed at the head of the bay, where it contracts. A trap had been driven here almost entirely across the bay, but as few fish were taken more piles were driven, and, it is said, a close-mesh net was stretched across the stream so effectually that not a salmon could pass.

Fishing is carried on entirely with drag seines, one crew fishing in Naha Bay below the tidal rapids, and another in the first lake above the rapids.

The following shows the statistics of Naha Stream from 1887 to date. While the record is not very clear in some seasons, in the main it is correct:

Year.	Species.	Dates.	No.
1887..	Redfish ...	Not given	74,483
1888..	Redfish ...	June (first on 18th, 50) ...	2,153
		July	42,833
		August (no record, but taken from totals).	30,218
		Total	75,204
		This cannery was first operated in 1888. The above fish made 8,360 cases, averaging 9 to the case. Cases of cohoes not given. The stream also furnished 99,200 humpbacks, making 6,200 cases, 16 to the case; and 67,500 more humpbacks were salted, making 900 barrels, of 75 to the barrel. Judging from the records, the pack in 1888 was made entirely from the home stream and Karta Bay fish.	
1889..	Redfish ...	June (first on 22d, 850) ..	3,902
	Do....	July	35,202
	Do....	August, to 20th	36,730
		Total	75,834
1890..	Redfish ...	June (first on 20th, 1,550).	10,921
	Do....	July	53,231
	Do....	August, to 28th	3,507
		Total	67,659
	Cohoes....	Aug. 28 to Sept. 12	4,827
1891..	Redfish ...	June (first on 14th, 49) ...	8,494
	Do....	July	69,551
	Do....	August, to 27th	18,351
		Total	*96,396
	Cohoes....	Aug. 20 to Sept. 11	*3,013
	Humpback	One taken June 30.	
1892..	Redfish	June (first on 16th, 18) ..	52
	Do......	July	19,585
	Do......	August, to 18th	2,779
		Total	†22,416
	Cohoes......	Aug. 25 to Sept. 9	4,495
1893..	Redfish	June (first on 23d, 350) ...	1,532
	Do......	July	41,154
	Do......	August, to 8th	3,430
		Total	‡46,116
1894..	Redfish	Approximate	56,490
1895..	Redfish	June (first on 20th)	1,347
	Do......	July	10,136
	Do......	August, to 19th	3,250
		Total	14,733
	Humpbacks.	July (first on 19th)	14,465
	Do......	August	326,504
		Total	340,969
1896..	Redfish	June (first on 19th)	621
	Do......	July	25,011
	Do......	August, to 23d	18,150
		Total	43,782
	Humpbacks.	July (first on 18th)	51,869
	Do......	August	309,869
		Total	361,738
1897..	Redfish.....	July 7 to Aug. 14	16,000
	Humpbacks.	July 9 to Aug. 24	130,000

* Paid for outside fish, 6 cents each for redfish, 9 cents for cohoes.
† Another record gives a total for this year of 46,326.
‡ Another record given for 1893 is 52,800.

The average number of redfish taken per year, according to the above figures, is 53,555. The best authorities consider the stream good at present, under fair conditions, for 50,000 redfish, 5,000 cohoes, and 400,000 humpbacks, and, if properly cared for, it should yield 75,000 redfish per year. The stream seems ideal for salmon, and if improved, even under natural conditions, the run of fish could be increased very materially. No observations could be made on the spawning habits. It is improbable, however, that any humpbacks go over the falls, all spawning below; but the redfish go over the falls into the lake system, and this makes the conditions favorable for keeping the humpbacks from disturbing the nests of the redfish. It is probable, however, that many redfish fail to get over the falls, and others that succeed are bruised and injured. A hatchery might be very successful not only at the falls, where there is an abundance of water and fish, but at Loring, where water could be supplied from a stream back of the cannery.

At Loring they expect a few red salmon from June 20 to July 1, and by the latter date to have the cannery started. Redfish are then packed until the end of August, the latter part of this time, however, only in a scattering way and in connection with the other species. A few cohoes are packed during the early part of August, and this is continued until the cannery closes, about September 20, though these fish are

CANNERY AT LORING.

never very abundant. The humpbacks commence coming to the cannery about the middle of July and are packed until the latter part of August. The dog salmon is very little used for canning. Sometimes a few find their way into humpback cans, but as a rule they are not used. A few hundred cases were packed at Loring in 1896, from July 17 to August 7, but none in 1897.

During the winter of 1896–97, from the latter part of December until April, Naha Bay was filled with small salmon from 6 to 10 inches in length. They were probably young king salmon, but they may have been redfish. They took the troll readily. No attempt was made at seining. A few were shipped fresh to Seattle, and a few others were salted for local use. They were full of spawn, but not ripe, and none entered the river. It is believed around Loring that 20,000 cases of these fish could have been packed.

YES (OR M'DONALD) BAY.

Yes (or McDonald) Bay is a narrow inlet opening into the western shore of Behm Canal, extending in a general northwest direction about 20 miles to the northward of Loring. Midway the length of the bay, on the northern shore, is the cannery of the Boston Fishing and Trading Company. The buildings are on the peninsula formed by the bay and the right bank of Yes Bay Stream.

In 1886 Rhode & Johnson located at Yes Bay and salted salmon. The following year the firm became Ford, Rhode & Johnson. Several thousand barrels were salted and part of the present cannery buildings were put up. In 1888 the cannery buildings were completed and several thousand barrels of salmon were salted. In 1889 the machinery was installed and a pack of between 4,000 and 5,000 cases made. The same year the Boston Fishing and Trading Company was incorporated, Ford & Rhode transferring their interests to that concern. The cannery is at present largely, if not entirely, owned, operated, and managed by Mr. D. W. Crowley, of Portland, Oregon. It is one of the smaller canneries of Alaska. While not equipped with all the latest appliances, it has packed between 20,000 and 25,000 cases per year for several years.

The following statement shows the pack for 1896 and 1897:

Species.	1896.			1897.		
	Date of packing.	No. of cases packed.	No. of fish per case.	Date of packing.	No. of cases packed.	No. of fish per case.
Redfish	July 11 to Aug. 25	7,000	9	July 12 to Sept. 4	6,754	9
Cohoes	Aug. 20 to Sept. 15	2,100	6	Aug. 16 to Sept. 12	1,644	6
Humpbacks	Aug. 5 to Sept. 5	15,000	16	July 12 to Sept. 6	12,806	15
Dog salmon				July 17 to Aug. 7	1,096	6
Total		24,100		Total	22,300	

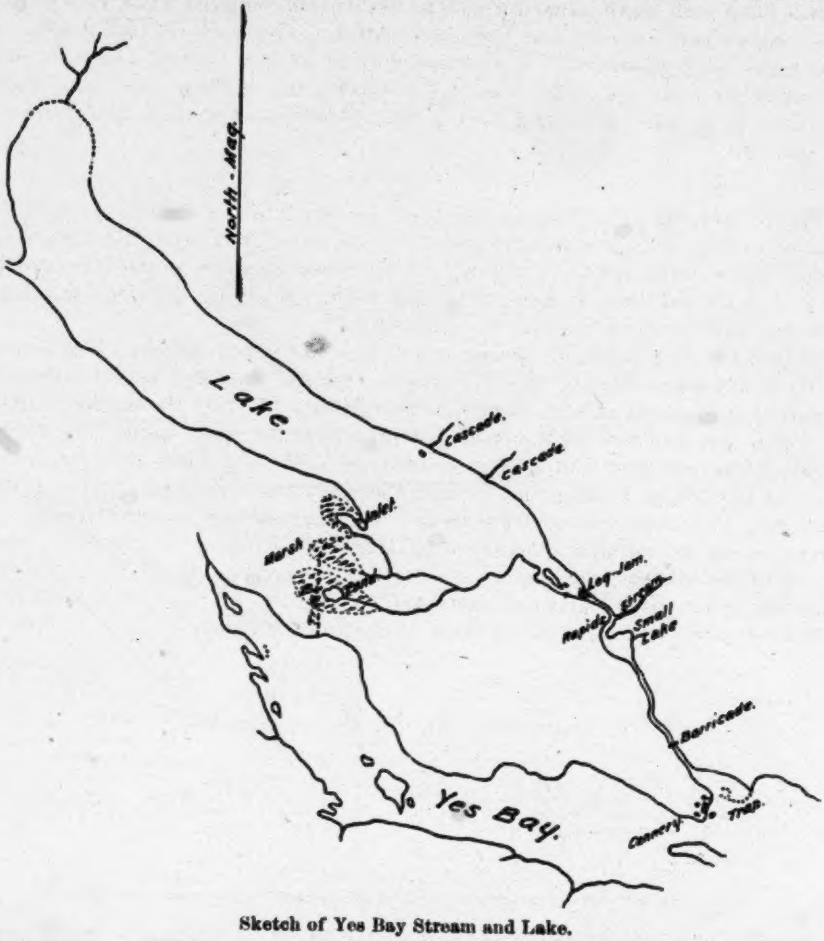
NOTE.—From July 12th to September 12th 3,037 cohoes were salted, making about 150 barrels.

In 1896 there were employed 15 white and 20 native fishermen, and in the cannery 3 whites, 50 Chinese, and, during the busy season, 10 "klootchmen." Four drag seines were used, 80 to 140 fathoms long, 3-inch mesh, valued at $1.50 per fathom, and 1 purse seine 320 fathoms long by 30 fathoms deep, 3-inch mesh, valued at $800.

One small steamer, the *Rosie*, of 5 tons, crew of 2, and valued at $2,000, tends the cannery. An additional steamer is sometimes chartered during the busy season. There were 6 lighters, or fish-scows, valued at from $50 to $75 each, and 4 seine boats, valued at from $50 to $75 each.

The cannery equipment in 1897 was the same as in 1896, except that in addition there was chartered the steamer *Alaska*, 38 net tons, crew 5, and valued at $5,000.

The redfish packed at this cannery come almost entirely from the home stream and Checats, the latter being also fished for the Loring cannery. They are of the larger variety, averaging about 9 to the case. Very few fish are bought. At Yes Bay the redfish run in sufficient numbers to permit the commencement of packing about the middle of July. In 1894 packing was begun on July 17; in 1895 on July 14; in 1896 on July 11, and in 1897 on July 12. It is expected that the cannery can be operated for redfish from July 15 to August 25. At the time of our visit, July 2 and 3, salmon were seen jumping in the bay, stream, and lake, but the manager stated that a sufficient number had not come in to warrant operating the cannery before the time mentioned.



Sketch of Yes Bay Stream and Lake.

The humpbacks are from Stewart Bay, Hot Springs, Burroughs Bay, Stewart River, Gedney Pass, and other localities where they school. About 225,000 are used, only a few being taken in the home stream. Cohoes are found scattering in different localities.

Yes Bay Stream empties into the bay near the cannery. At the widening of the mouth, where it enters the bay, a pile trap occupies three-fourths of the width of the stream at high water. The census report of 1890 states that as many as 5,000 salmon are taken out of this trap in a day. The stream flows with a strong current, in a general southeast direction, over a rocky and bowldery bed for almost its entire length. It is about a mile long, from 40 to 60 feet wide, and from 2 to 5 feet deep, carrying a large volume of water.

About 200 yards above the mouth of the stream, at the head of tide water, a partly dismantled barrier was found, which could be made effective, thereby closing the stream in a few hours. This barricade is of similar construction to those already described, except that the rails are separated like the rafters of a house, and gratings, or Indian fences, were formerly secured over them, and over all a wire netting. Some of the wire nettings had been carried away, but could easily be replaced.

The stream is the outlet to a lake, and about ¼ mile below it widens to about 200 yards, forming a lakelet about 6 feet deep with sand and gravel bottom. Immediately below the outlet is a rapid 150 feet long, 40 feet wide, by 2½ feet deep, and the stream, falling about 4 feet, spreads over granite bowlders to a width of 80 feet. A large stream with a delta enters at the rapids from the eastward. Above the outlet is a log jam, over which the lake can be crossed.

The lake lies in a general northwest-and-southeast direction, and is about 3 miles long by ⅜ to ½ mile wide. It is deep, especially along the northern side, where the mountains come to the edge. On the southern side are several shallow bights, in which marshy streams enter. A number of cascades were noted along the northern shore, two of them having grassy banks and gravelly beaches near the point of discharge. With these exceptions, the shores along this section are rocky and steep. The head was not visited, but it is reported that a large stream enters where the lake turns in between two mountain ranges. It is said that there is a second small lake connected with the main lake by a stream having a high fall, but no one could be found who had ever visited it. The main lake can be reached by trail from the bay, near the upper end, at a point about 2 miles from the cannery. The trail runs in a general northerly direction and is about half a mile long.

The following is the record of the Yes Bay fishery for a number of years. The figures for years prior to 1893 are not available.

Year.	Species.	Dates.	Total catch.	Year.	Species.	Dates.	No. of fish per case.	Total catch.
1893	Redfish.....	....	26,292	1897	Redfish.....	July 11 to Sept. 4 ...	9	60,900
1894	.....do	....	21,541	1897	Cohoes	Aug. 11 to Sept. 14 ..	6	9,511
1895	.....do	....	42,007	1897	Humpbacks	July 12 to Sept. 4 ...	15	165,606
1896	.....do	July 11 to Aug. 25 ..	46,706	1897	Dog salmon.	July 17 to Aug. 7 ...	6	5,862

This stream has been barricaded for many years. It has a fine lake system, and under fair conditions should yield 50,000 redfish per year. It is said that some years ago as many as 70,000 were taken from it. The locality seems well adapted for a hatchery.

In 1896, from July 15 to 20, an Indian supplied the cannery with about 100 king salmon taken in gill nets in the vicinity of Burroughs Bay. They were all very large, some of them reaching 89 pounds in weight. The cannery commenced packing them, but as there were so many white-meated ones it declined to take any more. The manager has under consideration the advisability of attempting a pack of king salmon. They can be taken and are in good condition as early as May 15, or as soon as the ice is clear of the bay.

CHECATS.

In Behm Canal, about 2 miles east of New Eddystone Rock, is an indentation or bay which receives a stream called Checats. This stream is said to have large red salmon and to be capable of yielding 10,000 a year.

The following figures were obtained, but no complete record was available:

Year.	Species.	Total number.	Average number per case.	Season of run.	Canneries to which consigned.
1895	Redfish	9,680			Yes Bay.
1896	Redfish	10,712		July 12 to Aug. 12	Yes Bay and Loring.
1897	Redfish	15,229	9	July 10 to Aug. 28	Do.
	Cohoes	489	6	Aug. 26 to Sept. 1	Yes Bay.
	Humpbacks	20,683	15	July 21 to Aug. 15	Yes Bay and Loring.
	Dog salmon	821	6	July 23 to Aug. 2	Yes Bay.

There are many streams entering Behm Canal and its branches that should be examined, but, so far as known, no others that have many redfish.

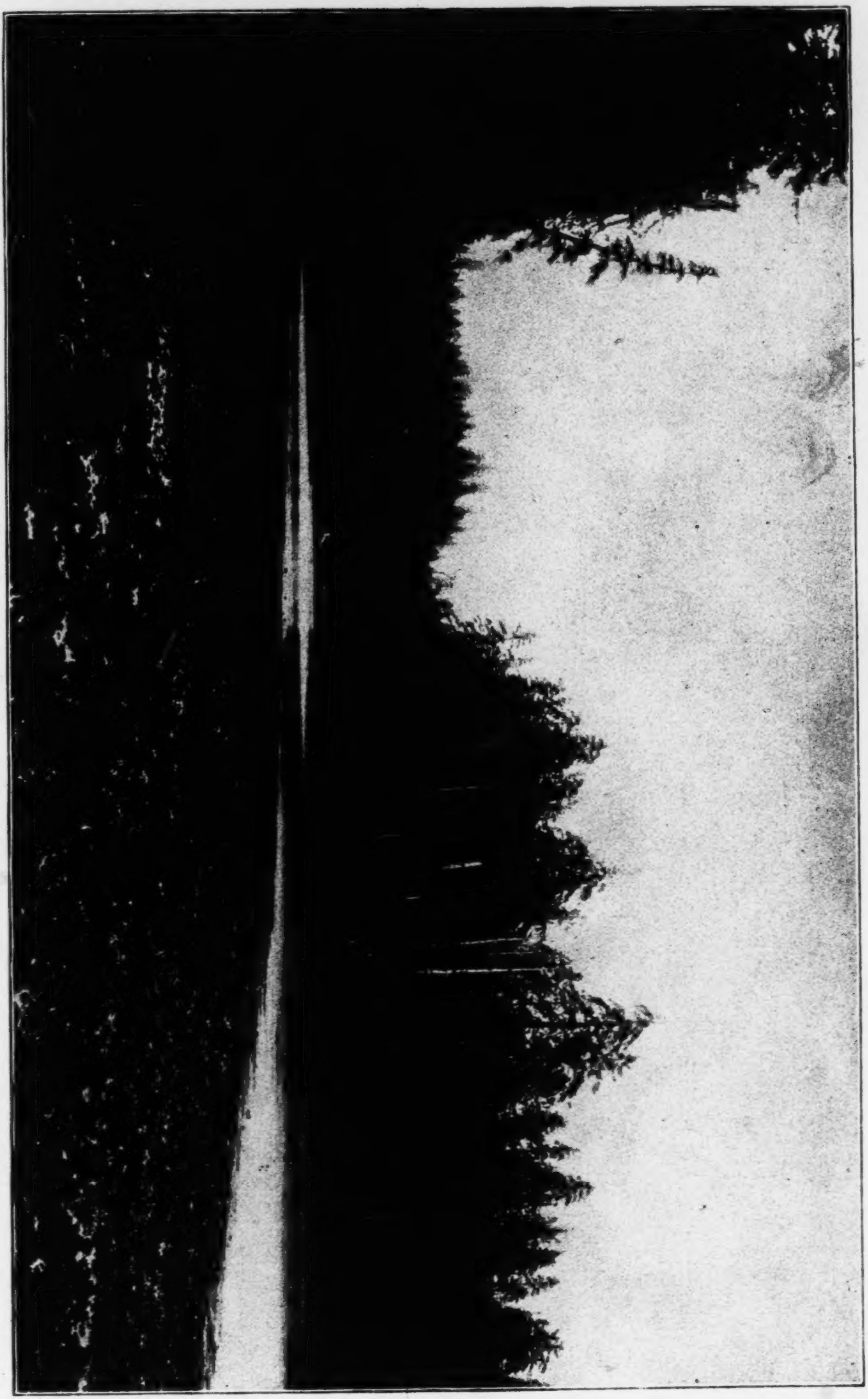
BURROUGHS BAY.

At a point where Behm Canal turns at right angles to the southward, Burroughs Bay enters, and at its head is the Unuk River, one of the largest streams of southeast Alaska, and said to contain king salmon, redfish, and cohoes. On the eastern shore, near the head of the bay, was formerly a cannery known as the Cape Lees Packing Company. Mr. James Miller operated a saltery here in 1886 and 1887. In 1888 Messrs. Andrew and Benjamin Young, of Astoria, built the cannery and operated it in 1888, 1889, and 1890; it made no pack after the latter year. In 1892 the cannery joined the Alaska Packing Association, and in 1893 it became one of the canneries of the Alaska Packers' Association. In 1894 it was dismantled, part of the machinery going to Loring and part to Wrangell. Mr. Miller states that from 1,200 to 1,500 cases of king salmon could be packed at Burroughs Bay, but that the proportion of white meated fish is very large. He also stated that he had taken salmon there weighing 90 pounds.

THORNE BAY.

Thorne Bay is an arm of Clarence Strait on the eastern side of Prince of Wales Island. Formerly all the waters to the westward of a line drawn from Tolstoi Point to Tolstoi Island were known as Tolstoi Bay. The chart has named the eastern bay "Tolstoi," and the western one "Thorne Bay," but the latter is still referred to as "Tolstoi," causing much confusion. In the bay named Tolstoi on Chart A there are no red salmon streams—in fact, no streams of any importance—while in Thorne Bay there is one very large stream, which empties into the head of the northwest arm, and differs entirely from any of the other streams thus far visited. It partakes more of the nature of a river, having a large estuary, and flows through a comparatively flat and level country, with the tide ascending a considerable distance. It is an outlet of a lake whose source is said to be from 12 to 15 miles from the mouth. No white man in the vicinity has ever visited it, and all that is known of it is from information given by an old Indian who hunts there during the winter. It is said there is a chain of

PLATE 39.

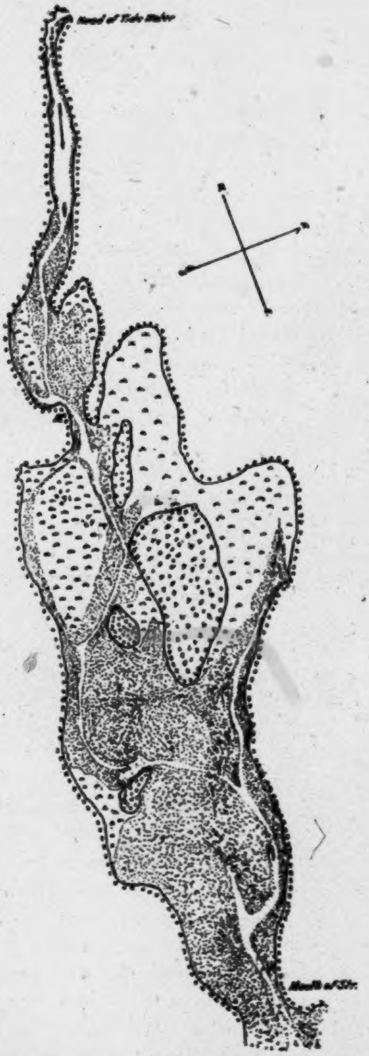


FLAT ALONG THORNE BAY STREAM.

lakes at the head, and that several tributaries to the river have lake sources. As it would have taken several weeks to thoroughly explore the locality, only the lower course of the stream was examined.

From the mouth of the stream to the head of tide water is a distance of about 2½ miles. At low water the stream runs a winding course through uncovered flats and grassy banks, at places separating into several channels or sloughs, while at high water these flats and banks are all covered, and it has the appearance of a large bay 2 miles long in a general east-and-west direction, with a greatest width of five-eighths of a mile, with wooded islets (one three-eighths of a mile long) and heavily wooded banks. The mouth is contracted to a width of about one-eighth of a mile, the flats extending into the outer bay some distance outside of the natural banks. These flats afford excellent seining ground at low water. At the head of tide water, where the stream flows between rocky banks, it is contracted to a width of 45 feet, expanding as it proceeds toward the sea to 120 feet, and about three-eighths of a mile down it opens out to 300 yards, contracting again about one-eighth of a mile beyond, and then opening into the large high-water bay. At this point is a small wing of rocks and rails and the remnant of a wire net, which probably formed at one time a barricade. The depth here at high water would be about 7 feet. There are no indications that the stream has been barricaded in recent years.

The bottom over the flat generally consists of gravel and sand; in the narrower part it is rocky, and above tide level becomes more so, though for about a quarter of a mile above it runs through bottom lands between wide, high gravel banks, heavily wooded and in some places grassy. The fall of the main stream is slight, and occasionally there are deep pools. At the time of our visit the main stream, above the influence of the tide, had an average depth of 18 inches over a riffle 75 feet wide. Half a mile below the high-water mark the stream becomes brackish, increasing in salinity toward the mouth; yet it is said that humpbacks spawn all over these tidal flats, and



Sketch of stream at head of Thorne Bay, taken at low water. From mouth to head tide water. High-water mark in heavy lines.

frequently, as the tide falls, the eggs are exposed to the sun, and the sea birds feed upon them. The shoals and flats at the mouth of the stream barely admit a boat at low water, but at high water one may go up the stream as far as tide water extends.

About 1888 a saltery was established on the northern shore of the entering arm at Thorne Bay. The following year it was sold to the cannery at Loring, then operated by the Cutting Packing Company, of San Francisco. In 1892 this saltery was sold to Mr. Robert Bell, who moved it to its present site and abandoned the old station. Two or three Indian houses are all that now remain at that point. The saltery at present is located on the upper end of the northwest arm, on the western shore, at the extreme end of the river flats, and is not only close to the fishing-grounds, but is on one of the best harbors in southeast Alaska. The saltery building is over the wharf, and back of it are several dwellings. The owner lives there.

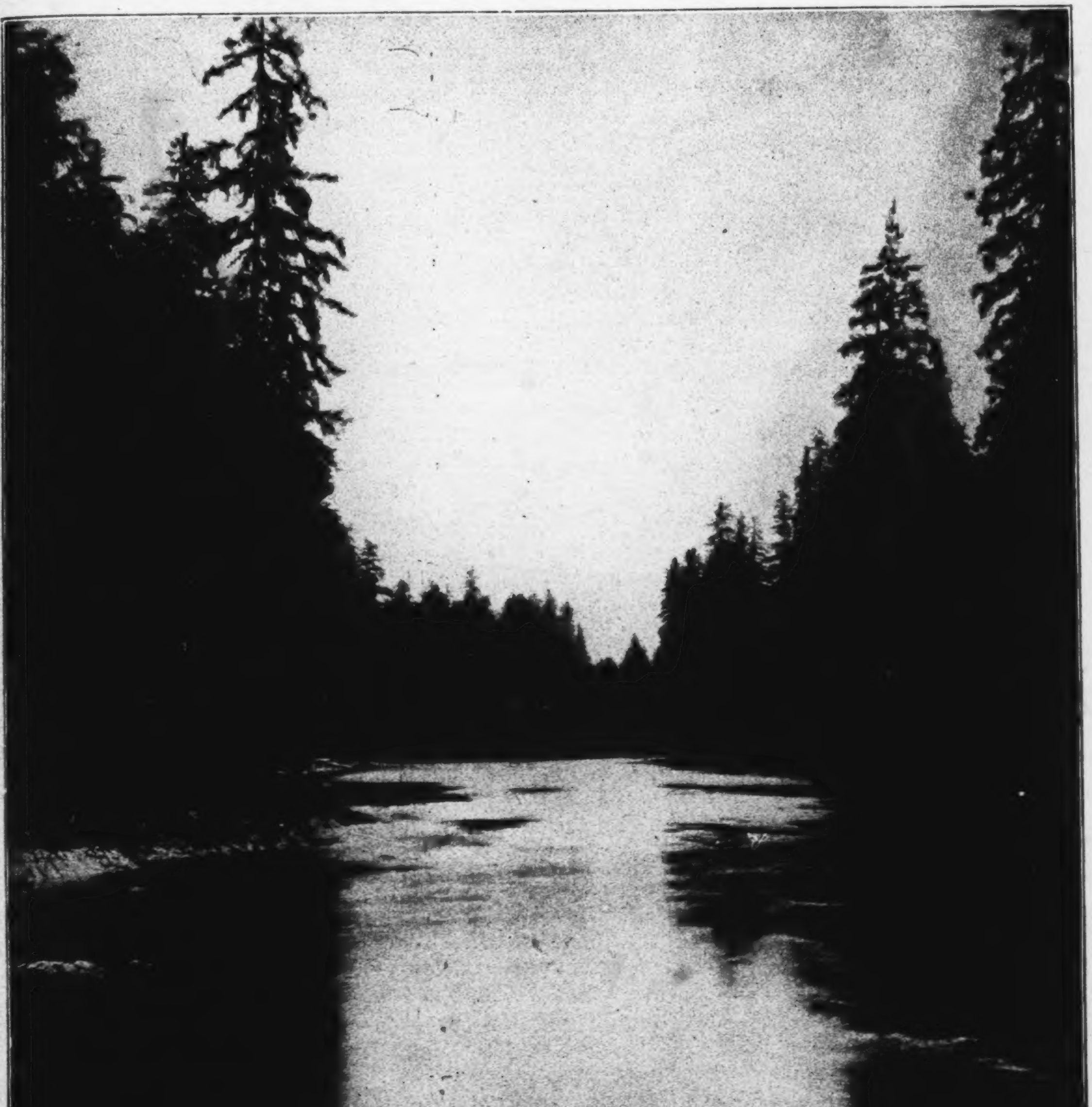
No fish were salted for the first two years after the saltery was moved; all were carried to Loring and sold fresh for packing. The plant, without fishing gear, is valued at $1,500. Eight men are employed for 2½ months during the fishing season, and 20 men for one month during the time of the heaviest runs. Two drag seines are used, 3-inch mesh, 125 fathoms long by 5 fathoms deep, valued at $1.50 per fathom. Four seine boats, valued at $50 each, are employed.

The following incomplete statistics give all the obtainable record of Thorne Bay stream:

Year.	Species.	Number taken.	Time of fishing.	Remarks.
1889..	Redfish	10,790	July 6 to Aug. 17	385 taken on July 6.
1890..	Redfish and cohoes	52,516	July 10 to Sept. 10	Species not separated; probably one-third were cohoes. Large redfish brought 10 cents, small redfish 6 cents, cohoes 14 cents, delivered at cannery.
1891..	Redfish	14,456	June 28 to Aug. 1.. ..	3,400 taken on June 28.
	Cohoes............	11,698	Aug. 17 to Sept. 1.....	2,760 used at Loring cannery, the remainder salted at Tolstoi fishery.
1896..	Redfish	5,000	....	Average weight, 5 pounds; salted, making 86 barrels, worth $6 to $8 per barrel net.
	Cohoes............	25,000	....	9,000 sold to Loring, rest salted, making 450 barrels, worth $6.50 per barrel on Seattle wharf. Average weight of fish, 8 pounds.
	Humpbacks	80,000	....	25,000 sold at Loring, bellies of remainder salted, making 470 half-barrels, worth $4.50 per half-barrel net. Average weight of fish, 3½ pounds.

It was ascertained at Loring that 600 half-barrels of humpback bellies and 160 barrels of cohoes were salted in 1897. It was stated that the stream at present will yield annually 5,000 redfish, 25,000 cohoes, and 200,000 humpbacks; that it is a very early redfish stream, the first arrivals, from June 1 to 10, depending upon the season, and that the run usually ends about August 5. From the scanty records, it would seem that it will furnish perhaps 10,000 redfish, if fished by a cannery. After the redfish have commenced to run many are taken that seem very much out of condition. They are very thin and the intestines are found closely adhering to the body walls.

The stream is also known as having very early runs of cohoes, the first fish appearing about July 5, and the run continuing until September 13 to 25, but the fish are small; in fact, it is said that the cohoes of all the island streams are small, those from the streams on the mainland being much larger. The humpbacks here run from August 1 to September 1, the fish averaging larger during a big run than during a small one. The dog salmon run with the humpbacks, but are not used. Steelheads run from November to April, though scattering ones are taken every month in the



HEAD OF TIDEWATER, STREAM AT THORNE BAY.

year in various spawning conditions. Spent steelheads have frequently been taken on their return to the sea.

Trout are numerous in this stream, and not only here but everywhere in Alaska the cry is to exterminate them, or at least not to protect them by law, as they are regarded as the greatest enemies to the salmon, destroying the eggs in countless numbers. Dolly Varden trout are found running from June 10 to July 15, and follow the salmon to the spawning-beds. The cut-throat trout also come down to brackish water about the same time.

In 1895 three shad were taken in a trap in Thorne Bay, and it is believed that if traps were more extensively used shad would probably be taken in many different localities in southeast Alaska.

UNION BAY.

On the western side of Cleveland Peninsula, and opening into Ernest Sound, is Union Bay. In this locality is a small red-salmon stream fished by Mr. Myers, who sells the catch, with that of Kina, in Kasaan Bay, which he also fishes, to the Loring cannery.

The following records have been obtained:

1896.			1897.		
Species.	Dates.	Number.	Species.	Dates.	Number.
Redfish	July 16 to 31	3,258	Redfish	July 26 to Aug. 26	4,700
Do	Aug. 3 to 7	1,393	Cohoes	Sept. 1 to 20	2,250
Cohoes	Sept. 1 to 14	1,406	Humpbacks	July 26 to Aug. 26	9,874

WRANGELL.

In 1887 the Aberdeen Packing Company, of Astoria, Oreg., built a cannery on the Stikine River, about 8 miles above the mouth, with the intention of making the entire pack from the catch of this river. After packing two seasons, in the fall of 1888 and spring of 1889, the cannery was moved to Point Highfield, on the northern end of Wrangell Island, and operations commenced under the name of the Glacier Packing Company. In 1892 it entered the Alaska Packing Association and was closed, and in 1893 it joined the Alaska Packers' Association, and has since been operated by that organization. In 1896 it was enlarged, and now has a capacity of 1,500 cases per day. The cannery is located in a small bight to the eastward of and just inside of Point Highfield, about 1½ miles from Wrangell post-office, and 2 miles from the flats at the mouth of the Stikine River.

In 1896 the cannery employed 20 white fishermen, and received the catch of 70 natives. In the cannery were 8 whites, 4 native women, and 80 Chinese. The cannery fishermen used for king salmon 14 large gill nets, each 250 fathoms long, 24 meshes deep, 8½-inch mesh, valued at 40 cents per fathom; for redfish and cohoes, 14 small gill nets, each 200 fathoms long, 26 meshes deep, 6½-inch mesh, valued at 40 cents per fathom, and 9 drag seines, from 50 to 150 fathoms long, 3 to 8 fathoms deep, valued at $1.50 per fathom.

The vessels engaged were the steamer *Puritan*, 14 net tons, crew 5, value $10,500, and the steamer *Ella Rohlffs*, 37 net tons, crew 5, value $14,000. Usually but one of these tenders is used. The ship *Geo. Skolfield*, 1,276 tons net, value $16,000, with a crew of fishermen, was used as a transport. The same arrangement is made here as at Loring. The ship brings the outfit to the cannery in the spring and moors in the stream; the crew then become fishermen, and the officers do duty in connection with the cannery. In the fall the ship carries the pack and outfit back. The cannery uses 2 lighters, one valued at $50, the other at $400; 14 Columbia River boats, valued at $180 each, and 20 skiffs, dories, etc., valued at $25 each.

Cannery near Wrangell.

This cannery and that at Pyramid Harbor are the only ones in southeast Alaska that pack king salmon, and even at these places this fish forms a very small part of the pack.

The following gives the statistics of the pack for 1896:

Species.	Dates.	Number of fish.	Number of cases.	Number of fish per case.	Remarks.
	1896.				
King	May 15 to May 31	1,239	987	4	All taken in gill nets around mouth of Stikine River. These fish would appear to average about 16 pounds, but the real average is said to be about 22 pounds. Of the total number, many are consumed at the factory and many others are not used because they are white-meated.
	June 1 to June 22	2,719			
		3,958			
Redfish	June 22 to June 30	7,914	12,584	9.88	About 30,000 taken around mouth of Stikine River; the rest in drag seines. Average weight rather under 7 pounds.
	July 1 to August 31	115,623			
		123,537			
Cohoes	July (first on July 1)	23,064	11,010	8.3	30,000 taken in gill nets around mouth of Stikine River; the rest in drag seines. Average weight said to be about 11 pounds, but this is not consistent with figures given.
	August	32,403			
	September to 16th	31,653			
		87,120			
Humpbacks	July 1-31	68,770	19,652	18.4	All taken in drag seines.
	August 1-29	291,505			
		360,275			

STREAM AT THORNE BAY.

In 1897 the cannery received and packed the following salmon, according to the cannery books:

Species.	Dates.	Total number of fish.	Number of cases.	Number of fish per case.	Remarks.
	1897.				
King	May 15 to June 25.....	4,946	1,246	3.9	All taken in gill nets at mouth of Stikine River.
Redfish	June 25 to Aug. 6.....	70,870	7,428	9.5	
Cohoes	July 7 to Sept. 15.....	76,153	8,620	8.8	
Humpbacks	July 12 to Aug. 18....	662,563	28,624	23.1	

In 1896 and 1897 the cannery paid $5.50 per 100 for redfish and cohoes at the fisheries, and $7 per 100 delivered; and for humpbacks 50 cents per 100, the steamer calling for them. The run of redfish in 1897 was very small, but humpbacks were so plentiful that the canneries here, as elsewhere, did not have the facilities for handling the catch.

The fishing contract here differs from that at Loring on account of the gill-net fishing. The company pays each man $125 for his services in taking the transport vessel to the cannery and back to San Francisco, and for discharging and loading at the cannery. There are two men to a gill-net outfit. When fishing commences the cannery supplies the gear and pays 5 cents for king salmon and 2½ cents each for redfish and cohoes. The fishermen also receive their board and lodging. The Chinese contract price for packing is 40 cents per case.

The streams supplying the cannery at Wrangell are the following: Stikine River, Salmon Bay, Red Bay, Lake Bay, Whale Passage, Ratz Harbor, Old Village, Anan (Bradfield Canal), Kah-Sheets, Wrangell Narrows, and incidentally a few fish are received from Shipley Bay and Point Barrie.

STIKINE RIVER.

The Stikine River (see Chart A) is the largest in southeast Alaska, and is the only one that is navigable; but as yet it has no very important relation to the salmon fisheries. A small stern-wheel steamer of light draft makes occasional trips to the trading posts located on its upper waters. The Cassiar gold discovery, near its headwaters, gave it additional interest in 1875-1877, and it has been much talked of as a route to the upper Yukon. It is said to receive the waters of 300 glaciers. It discharges through a wide delta with numerous shallow channels and a current of from 3 to 4 miles an hour, but in the upper waters, where it rushes through the canyons, the velocity probably reaches 10 miles. The flats formed by the river silt close the passages to the northward between the islands and the mainland, except for small boats.

It is believed that the run of all species of salmon up this river is large, and, if they could be easily captured, several canneries might be supplied; but only gill-net fishing is feasible, and on account of the wide expanse of river mouth, the numerous snags and bowlders, and strong currents, this method is not very profitable, as the best salmon are obtained in Alaska for a cent a pound, and in some places for little more than a cent a fish. The fishing here is carried on around the flats at the mouth of the river, in the sloughs and channels where the current is not too strong. Usually the gill nets are anchored; sometimes they are drifted. The Wrangell cannery in a good season expects to obtain from the Stikine from 4,000 to 8,000 king salmon, 30,000 redfish, and 30,000 cohoes. It is probable that few salmon go to the headwaters, but they enter the numerous lower tributaries.

Fishing for king salmon commences about May 15, or as much earlier as the ice may permit, and continues until the latter part of June, when the redfish begin to run; the fishing gear is then changed. It is the general belief in Alaska that king salmon will run only in the streams carrying glacial water. Of the king salmon taken here, about one in six has white meat, the same ratio being preserved throughout the fishing season.

The only available record for the Stikine is for 1897, and is as follows:

Species.	Dates.	Number.
King	May 15 to June 25	4,680
Redfish	June 25 to July 30	21,206
Cohoes	Aug. 15 to Sept. 15	19,722
Humpbacks	July 12 to Aug. 18	20,394

The limited time permitted the examination of only one stream fished for this cannery, Kah-Sheets, and the others are referred to briefly with such data as could be obtained. Red Bay, Salmon Bay, Lake Bay, and Whale Passage are localities claimed and fished by Mr. Thomas McCauley. Several years ago there was a saltery at each of these fisheries, but they are now consolidated into one, which is located on Whale Passage. The catch from the streams in these places is sold by contract to the Wrangell cannery.

PRINCE OF WALES ISLAND, NORTHEAST SIDE.

In this region are located Lake Bay, Whale Passage, Salmon Bay, Red Bay, and Ratz Harbor. Lake Bay is situated on the northeast side of Prince of Wales Island (see Chart A) on the passage inside of Stevenson Island. The approaches are all foul and the bay inaccessible for a large vessel. The stream is known as a coho stream, and the run is the earliest in southeast Alaska, but the fish are small. It is said to have a capacity of from 50,000 to 60,000 cohoes and 5,000 to 10,000 redfish. There are, however, no records for redfish.

The following records of cohoes from Lake Bay were obtained:

1896.		1897.	
Dates.	Number taken.	Dates.	Number taken.
July 1 to July 31	23,064	July 7 to July 31	8,353
In August	25,629	Aug. 2 to Aug. 31	21,589
Sept. 1 to Sept. 16	9,452	Sept. 2 to Sept. 12	17,642
Total	58,145	Total	47,584

Whale Passage is about 5 miles to the westward of Lake Bay. The stream, which is essentially a humpback stream, is in the northwest arm of the passage. The saltery, operated here by Mr. Thomas McCauley, utilizes the fish that can not be handled at Wrangell. The stream is said to have a capacity of 200,000 humpbacks and from 2,000 to 3,000 cohoes. 1,400 half-barrels of humpback bellies were salted in 1897.

WATERFALL IN STREAM AT DUNCAN CANAL ABOUT ONE MILE FROM MOUTH.

MOUTH OF STREAM, DUNCAN CANAL, SHOWING GRAVEL BEDS.

The following gives the only available data for Whale Passage:

Year.	Species.	Dates.	Number taken.
1896	Cohoes	Aug. 18 to Sept. 11	2,050
1897	Humpbacks	July 12 to Aug. 18	225,000

No record was kept of humpbacks in 1896, as the contract was "by the case," but the catch was made from August 1 to September 1. No record was made of cohoes in 1897.

Salmon Bay is on the northeast side of Prince of Wales Island, about 10 miles from Whale Passage. It is a small bay with a lake outlet in the northwest end. The stream has a capacity for 20,000 redfish.

Red Bay is about 6 miles westward of Salmon Bay. At its head, on the eastern side, is a redfish stream with a capacity of from 18,000 to 24,000 fish.

The following are the available records of Salmon Bay and Red Bay:

Year.	Salmon Bay.			Red Bay.		
	Species.	Dates.	No. of fish.	Species.	Dates.	No. of fish.
1896	Redfish	July 1 to 30	19,725	Redfish	July 18 to July 31	16,348
1896	Cohoes	Aug. 1 to 31	2,682	Do	Aug. 1 to Sept. 1	4,542
1897	Redfish	July 1 to 15	15,012	Do	July 7 to July 29	12,004

Ratz Harbor is situated on the northeast shore of Prince of Wales Island, about 15 miles north of Tolstoi. At the northwest end of the harbor a stream enters, which is reported to yield 60,000 humpbacks, and is fished by the Wrangell cannery when the supply of humpbacks from streams nearer their route is short. There are no records for this stream.

OLD VILLAGE.

In the southern part of Zimovia Strait, about 6 miles below Deserted Village, is a rocky bay making into Wrangell Island. At the head of this bay is a stream, having a capacity of from 15,000 to 20,000 redfish, fished by Wrangell cannery.

The statistics for 1897 are as follows:

Species.	Dates.	No.
Redfish	June 28 to 30	907
	July 8 to 27	13,161
	Aug. 1 to 6	3,050
Cohoes	Aug. 6 to 31	1,902
Humpbacks	July 12 to Aug. 18	42,109

ANAN, BRADFIELD CANAL.

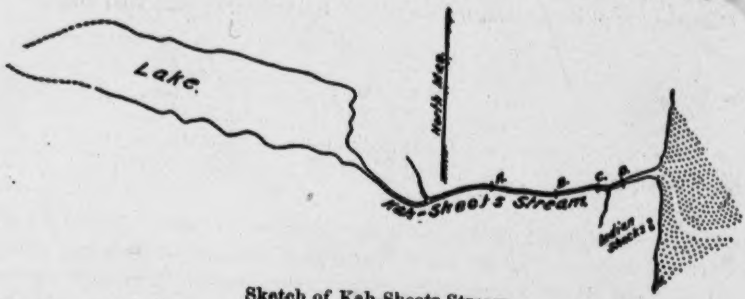
At the entrance to Bradfield Canal, on the southern shore, in the angle formed by the shore line running first east from Point Wards and then north, is a stream which is fished by the Wrangell cannery, and which supplies a large number of humpbacks. The fish commence to run in the first part of July, and the stream is reported good for 300,000. In 1897 the Wrangell cannery obtained 375,000 humpbacks between July 12 and August 18.

WRANGELL NARROWS.

Opposite Finger Point is a small stream which supplies, under ordinary conditions, 2,000 redfish. In the northern end, in the bight opposite Turn Point, is a stream which supplied Wrangell cannery in 1897, from August 18 to September 1, with 4,904 cohoes. This is also a good humpback stream.

KAH-SHEETS.

At the entrance to Duncan Canal, on the western shore, in the upper end of the bowldery bay inside of Lung Island, a redfish stream was examined. Its mouth is north of a narrow tongue of land making to the eastward and to the northward of a house occupied by a number of Indians. The stream is a lake outlet, about 3 miles long in a general east-and-west direction, and 60 to 70 feet between banks, but at the time of our visit the flow was only about 20 feet wide and 6 inches deep. The bed is generally rock and coarse gravel. At four different places the stream drops in falls and cascades. The lake appeared to be from 3 miles to 6 miles long by ¾ mile wide, and is deep toward the center. The bottom, near the outlet, is mud and sand, and gravelly in a few places near the shore. This stream has a capacity of about 5,000 redfish. In 1897 it supplied the cannery at Wrangell as follows:



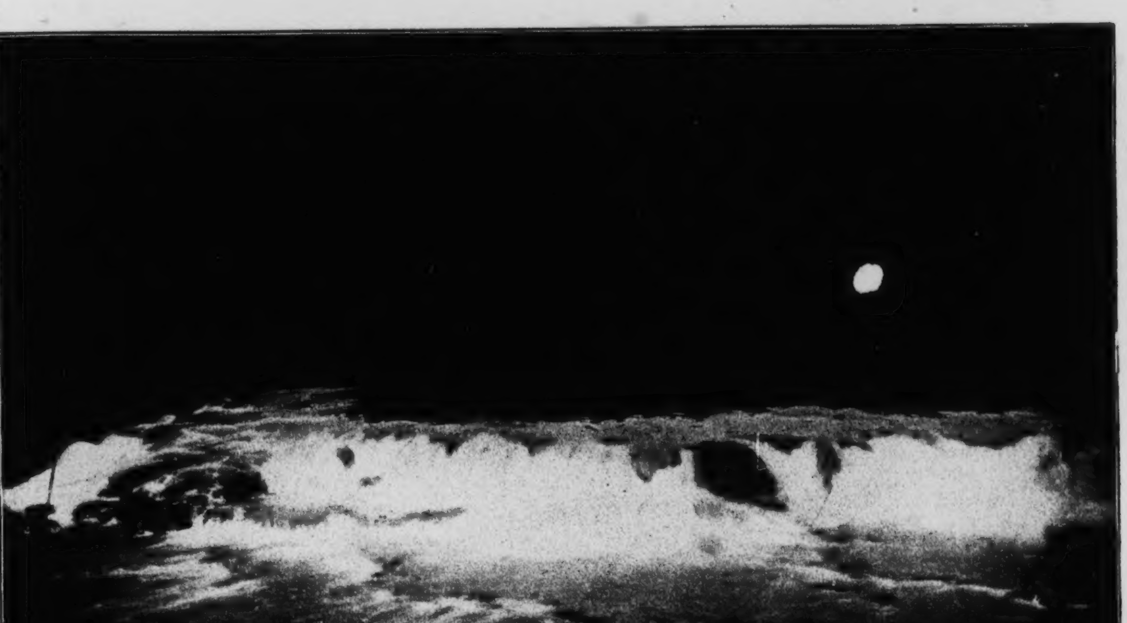
Sketch of Kah-Sheets Stream.

Species.	Dates.	No.
Redfish	July 3 to 28	3,502
Cohoes	Aug. 1 to 3	616
	Aug. 14 to 28	1,951

POINT BARRIE.

Point Barrie is the southwest point of Kupreanof Island, and in this vicinity is a stream said to have a capacity of 10,000 redfish. A small saltery is located here, and is operated with the fishery by Cyrus Orr. All the fish are sold fresh that can be disposed of in that way, but it is out of the track of cannery steamers. Occasionally a few are sent to Wrangell on the small mail steamer. In 1897 Wrangell received 692 redfish in that way. In 1890, when the census was taken, there was a small Indian village here and a store. Population, 89 Indians and 3 whites. The Baranoff Packing Company, of Redfish Bay, received from Point Barrie 4,467 redfish between July 9 and 20, 1892.

KAH-SHEETS STREAM.



STREAM AT LORING.

SHIPLEY BAY.

Shipley Bay is on the western side of Prince of Wales Island, and at its head has a stream which is said to yield 12,000 redfish annually. A small saltery on the bay is operated by Walter Kosmikoff, together with the fishery. This stream, like that at Point Barrie, is out of the track of cannery steamers, and a few salmon and salmon trout are salted and a few sold fresh. In 1897 the Wrangell cannery received 700 redfish from this fishery by mail steamer. The Redfish Bay cannery, in 1892, from July 9 to 20, took 6,762 redfish, and in 1893, from July 8 to 30, 5,295 redfish from this stream. These are the only records obtainable.

All these streams supplying the Wrangell cannery should be further examined.

ETOLIN ISLAND.

In 1892 Mr. J. C. Callbreath established a salmon hatchery on a small stream that never was known to run many redfish. It flows into the head of McHenry Inlet, on the western side of Etolin Island. The hatchery was built and is operated with the belief that salmon return to the parent stream. Mr. Callbreath has given the subject of Alaska salmon much study. He believes that artificial propagation will increase the run of this stream to such an extent that they can be taken in large numbers and sold with profit to the canneries.

KLAWAK.

Klawak is on the western side of Prince of Wales Island, near the head of an inlet of the same name, which is an arm of Bucarelli Bay. It is off the regular line of travel, but is on the mail route between Wrangell and Howkan, and once a month a small mail steamer calls at the post office here. The oldest cannery in Alaska is in operation at Klawak, and in connection with it a steam sawmill and store. During the summer the settlement has a population of 300, of which number 275 are Indians and the rest white and mixed. There are about 50 houses in the vicinity, and also a school maintained by the Government. The cannery is one of two that have always been operated by Indian labor, and it is this enterprise that has made the village. The Indians employed are Haidas from the south, and Henegas (Thlinget) from the north and vicinity. The village is practically deserted during the winter, except by the cannery watchman and the storekeeper, the Indians going to their winter villages.

A saltery was operated at the place now known as Klawak until 1878, when it was purchased, with all its rights, etc., for $5,000 by the North Pacific Trading and Packing Company, and the present cannery was built that year. This was the pioneer in the salmon-packing business in Alaska and now enjoys the distinction of being the oldest cannery in operation, and of having made a pack every year since it was started. It has a capacity of 400 cases per day, but it has been worked to 700 cases when occasion demanded. The plant differs somewhat from those recently installed, in that less machinery is used and the pack is largely made by hand. The cutting, filling, and capping are all done by hand, and the cookers are old-fashioned, with dome-shaped or cylindrical covers that are raised by tackle to admit the trays, and then lowered and clamped. The plant, however, is very complete; the buildings are large and well-aired, there is plenty of room, the wharves are in good condition, and everything is thoroughly clean. It is said that the pack made here is second to none in the market.

The cannery at Klawak is one of the smaller canneries of Alaska. It packs from 12,000 to 16,000 cases, the fish being obtained from the streams north and south of the cannery. The field was clear until 1896, when the cannery at Hunter Bay was built, and since that time the fishermen of the two canneries resort to the same streams on the south end of Prince of Wales Island. Ten years ago the Klawak cannery received fish from as far south as Hessa, and even from Nichols Bay, but in late years the principal sources of supply of redfish have been Hetta, the home stream, and Sar-Kar, with small intervening streams that some years have furnished from 1,000 to 2,000 redfish. Cohoes are nowhere very abundant in this district during the canning season, though the Indians say that large schools frequently come in after the cannery people leave. The Indian's idea of a large number, however, is usually measured by his own wants. He has no conception of a large number with reference to a cannery supply.

The Hetta stream has already been described.

The steam sawmill connected with the cannery has a capacity of 15,000 feet per day, but is only used for making boxes and supplying local demands.

The work at Klawak, from the taking of the fish in the streams to the loading of the cases containing the canned product on board the ocean carriers, is nearly all done by Indians—men, women, and children. From the earliest operations of the cannery until 1896 Indian labor has been exclusively employed, but in that year two Chinese were engaged, one for cap-cutting and the other for final testing and as general expert. In 1897 seven Chinese were employed, and the manager had under consideration the feasibility of using Chinese and doing away with Indian labor, chiefly upon the ground of economy, but also because Chinese labor is more certain and more easily controlled. If, at the beginning of or during a season, the cannery should decline to accede to the demands of the Indians for increased wages, a strike is apt to result, causing the loss of a pack.

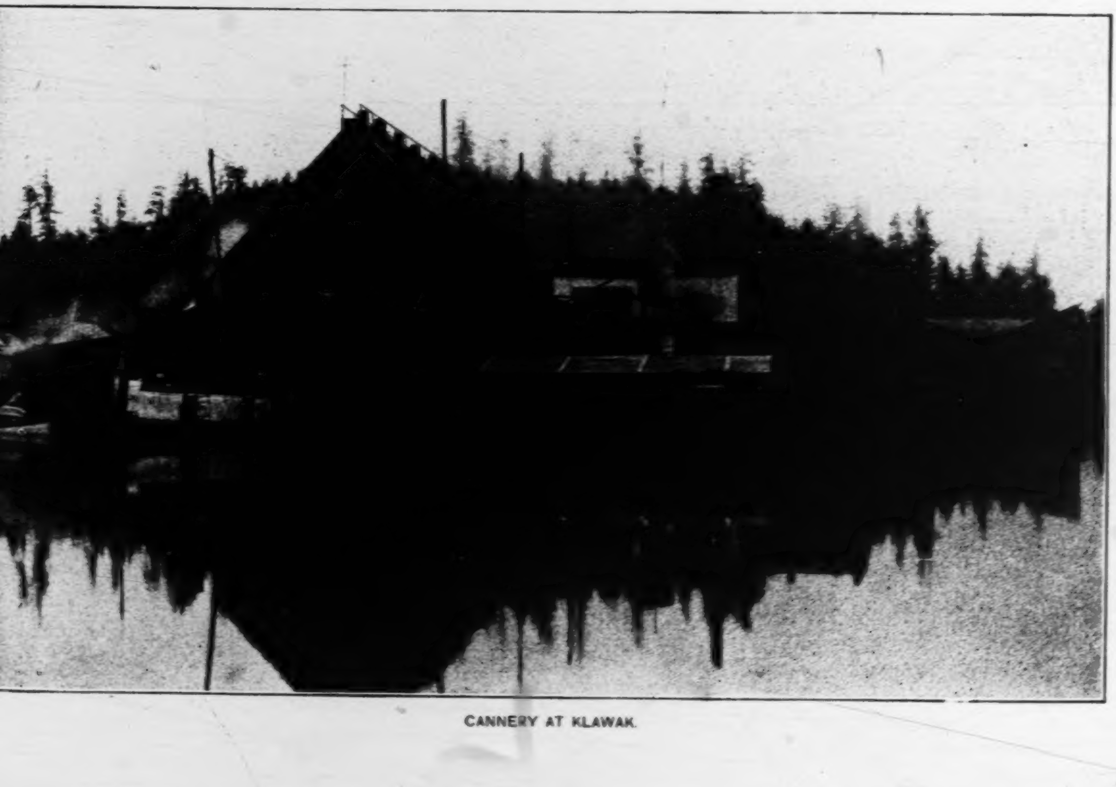
In 1896 the cannery employed 2 white and 40 native fishermen; and in the cannery the help consisted of 7 whites, 32 klootchmen, 30 men and boys, and 2 Chinese. There were used 4 seines, each 110 fathoms long, and valued at $300 each. The steamer *Klawack*, of 11 tons, with a crew of 4, and valued at $5,000, and the steamer *Cora*, with a crew of 3, and valued at $1,000, were the vessels employed; but in spring and fall a vessel was chartered as a transport. One fish-scow valued at $100, and 4 seine-boats valued at $90 each, were also used.

The following table gives the packs for 1896 and 1897:

Species.	Dates.	Number of cases packed.	Number of fish per case.	Remarks.
	1896.			
Redfish	July 19 to Aug. 23	14,069	13	40 barrels of salmon bellies were salted, 300 cases of clams were packed (24 two-pound cans to the case), also 300 cases of clam juice (24 one-pint cans per case).
Cohoes	Aug. 15 to Sept. 25	2,073	8 to 9	
Humpbacks	July 24 to Aug. 10	513	22	
	1897.			
Redfish	June 26 to Aug. 31	9,520	13	200 cases of clams and 200 cases of clam juice were also packed.
Cohoes	Aug. 18 to Sept. 20	1,995	8	
Humpbacks	July 26 to Aug. 22	4,190	22	

The sawmill and its machinery are valued at $13,000. The machinery also furnishes the motive power for the cannery. The cannery buildings, complete with storehouse, wharves, tramways, machinery, tools, fixtures, retorts, etc., are valued at a

HATCHERY AT KLAWAK.



CANNERY AT KLAWAK.

little under $20,000. The whole property, including all the above, cannery and sawmill, buildings, dwellings, wharves, tools, fixtures, and machinery, steamers, boats, seines, etc., but exclusive of material on hand, is valued at about $50,000.

When salmon were being packed it was noticed that the butchers on the fish float threw all the heads into canoes waiting alongside to receive them, and many canoe loads were carried away. Upon inquiry it was learned that the heads are put in baskets or bags placed along the shores between the high and low water marks, weighted with stones to keep them in place, and left for a week or ten days until thoroughly ripe; the snout or nose is then cut off and consumed by the Indians as a great delicacy.

PACKING CLAMS AT KLAWAK.

The clams in this vicinity are very abundant, and in the late summer and fall they are in excellent condition for packing, being full-flavored and white. In the spring they are very dark. The cannery each fall makes a small pack of a few hundred cases when the run of salmon grows slack, and the plant is idle several days at a time for want of fish. Owing to the great range of tide in Alaska and the great differences in the range, clams can only be obtained in quantities for a few days during the spring tides, so that if there were a large demand for them the pack would have to be incidental to the salmon pack or to some other industry to make it pay. So far, however, there has been very little demand for this product; the company has been unable to introduce it in competition with eastern goods. The clams are delicious, and the juice as prepared is pure and unadulterated except by the steam in cooking.

The Klawak cannery usually takes a few days in September for the clam pack, and prior to that time it notifies the Indians that clams will be purchased. Ten cents a bucketful is paid, the bucket holding about a peck. The wharf is first thoroughly cleansed and the clams are spread in one layer over it. A stream of salt water is then directed over them from a steam pump until they are perfectly clean. The clams are next put in a large perforated cylinder or tub holding about 8 bushels, and this rests on iron crosspieces placed over the upper end of a tight metal tub, which is a little larger in diameter and about one-third the height of the vessel in which the clams are placed. The whole is so arranged that in cooking, when the steam passes through the perforated tub holding the clams, the juice will fall into the lower tub. The tubs are made cylindrical in order to fit the retorts used here. The clams are then placed in the retorts, cooked under pressure at a temperature of 220° F. for twenty minutes, and then removed and placed on long, slatted tables, around which are seated "klootchmen," who remove the meat and cut off the black siphon or snout. The meat is carried to another table, cleansed by being passed through hot salt-water, and then packed into 2-pound cans. When the can is filled to the top with meat, hot juice is poured in, completely filling all the spaces, and the cans then go the solderer, by whom they are sealed.

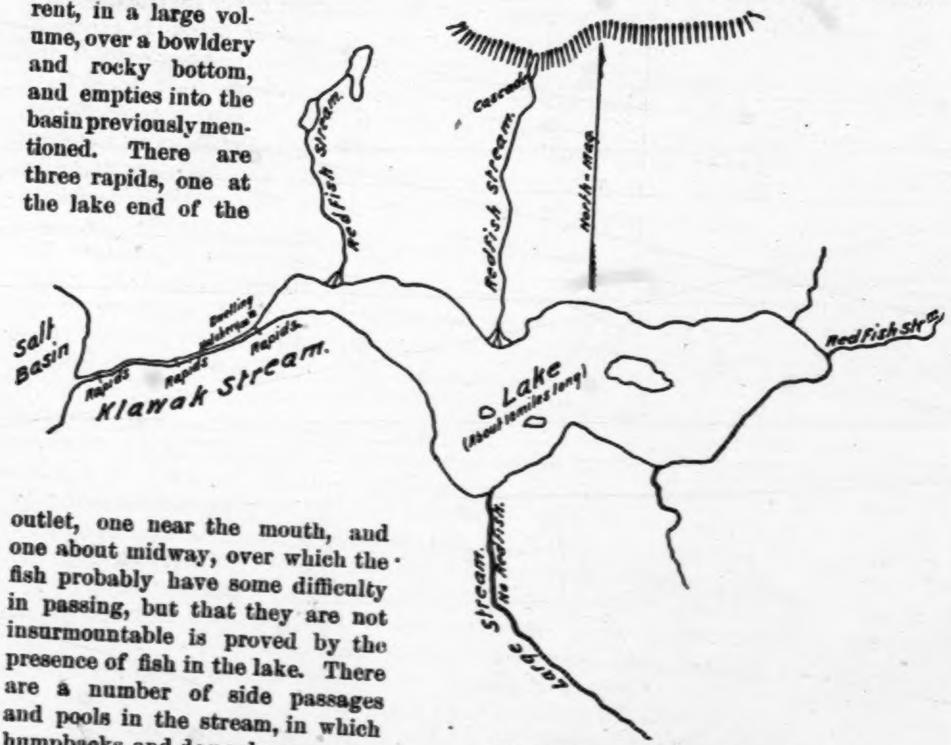
The juice, when removed from the retorts, is put into a barrel, and what is not used for filling up the cans of clams is poured into separate tins, each holding a pint. One-pound salmon cans are used for the juice, with caps having a small aperture to admit of soldering. After the cans are sealed they are tested, cooked, vented, sealed, cooked, tested, cooled, lacquered, tested, labeled, and cased. The day the cannery was visited 1,092 buckets of clams were packed, making 224 cases of 24 two-pound tins of clams and 190 cases of 24 one-pint tins of juice.

The Indians do all the work. They are neat, clean, and tidy, perform their work deftly, and receive $1 per day. It is extra work and not paid for by the piece. Before work was commenced about forty klootchmen presented themselves for employment, and from this number the manager made his selection.

KLAWAK STREAM.

Near the upper end of Klawak Inlet is a large island, close to the eastern shore, and around the northern end of this island is a narrow channel leading to the cannery, which, with the village, is on the southern end of a head making out from the main shore of Prince of Wales Island. A narrow passage around the cannery leads back of the buildings to a salt-water basin less than half a mile in diameter. This basin receives the waters of the home stream.

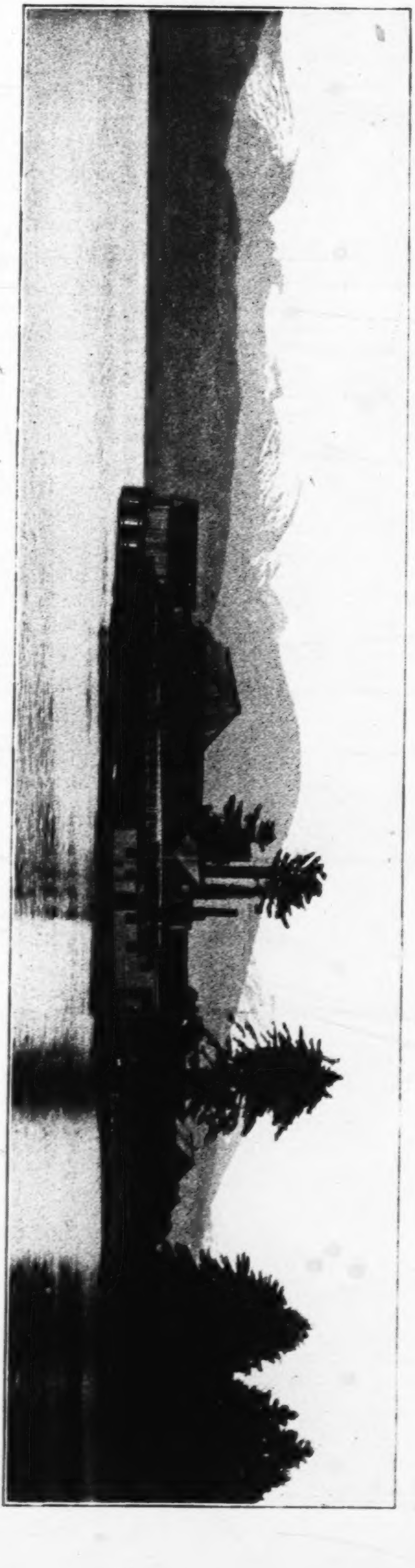
Klawak Stream is a lake outlet and from the lake it flows in a general west-southwest direction for 2½ miles, with an average width of fully 100 feet. It flows with a strong current, in a large volume, over a bowldery and rocky bottom, and empties into the basin previously mentioned. There are three rapids, one at the lake end of the outlet, one near the mouth, and one about midway, over which the fish probably have some difficulty in passing, but that they are not insurmountable is proved by the presence of fish in the lake. There are a number of side passages and pools in the stream, in which humpbacks and dog salmon spawn. The cannery company is considering either placing fish-ladders at the most difficult points of the stream or blasting out some of the ledges.



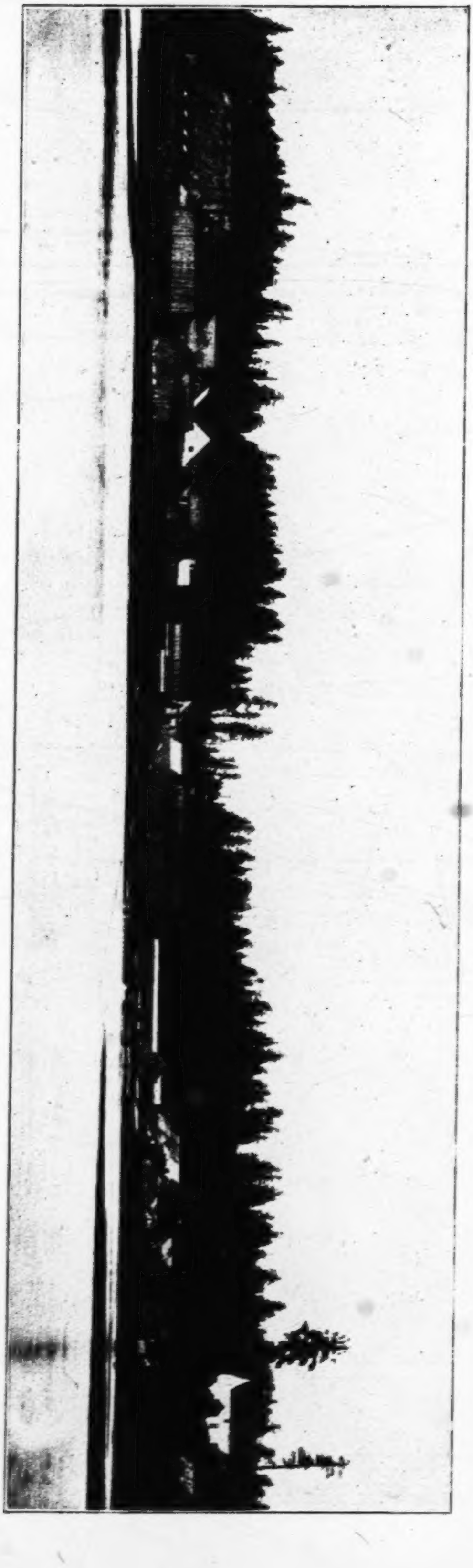
Sketch of Klawak Stream and Lake.

The lake is an irregular-shaped, elongated body of water, about 10 miles long in a general west-northwest and east-southeast direction, and from 1 to 2 miles in width. The shores, except for a short distance around the upper end, are low and flat and

PLATE 45.



CANNERY NEAR WRANGELL.



VIEW OF KLAWAK, LOOKING WEST.

extend back for a considerable distance before reaching the slopes rising to the higher ranges. This flat country is heavily wooded and along the shores are a number of gravelly beaches. The lake is fed by four large streams and several smaller ones. One on the northern shore half a mile from the outlet, one about 3 miles from the outlet on the same shore, and one at the head of the lake are all spawning-grounds for redfish. The largest stream enters the lake on the southern shore about 3 miles from the outlet, but red salmon do not spawn there. It drains a very low, flat area.

Klawak Stream has probably been fished longer and more assiduously than any other stream of Alaska. The cannery has been operated twenty seasons and a large number of fish taken from around the mouth of the stream at the cannery door. The natural facilities for taking the fish are very great, as they enter a natural trap in the basin back of the cannery and school around the mouth of the stream. The stream was barricaded and had an Indian trap in it for years, but as it was becoming depleted all traps and barricades were removed some years ago, and now the stream is carefully guarded and less extensively fished, in the hope of building up the run. There are now no signs of artificial barriers anywhere.

It is said that in the early days 80,000 redfish could be taken annually in the stream. The record for the past twelve years gives an average of 36,271, the largest catch being 62,602 in 1888. In 1896, a good redfish year, 37,172 were taken, and in 1897, a poor year, 12,764. A few steelheads are taken by the Indians. The stream at present is undoubtedly good for 35,000 redfish, and probably 40,000 under good conditions. It is believed that if properly cared for it could produce 80,000 redfish annually.

The following is the record of the stream since 1886:

Species.	Year.	Dates.	Number.	Species.	Year.	Dates.	Number.
Redfish	1886	July 21 to Aug. 20	5,424	Redfish	1892	June 24 to Aug. 17	40,555
Do.......	1887	June 27 to Aug. 15	41,180	Do.......	1893	June 22 to Aug. 31	33,166
Do.......	1888	June 27 to Aug. 22	62,602	Do.......	1894	June 21 to Aug. 15	34,722
Do.......	1889	July 1 to Aug. 13	19,361	Do.......	1895	June 23 to Aug. 14	40,526
Humpbacks .	1889	July 22 to Aug. 13	92,094	Do.......	1896	June 29 to Aug. 31	37,172
Redfish	1890	June 30 to Aug. 30	49,689	Cohoes.......	1896	Sept. 12 to 27......	2,667
Do.......	1891	June 16 to Aug. 15	58,096	Redfish	1897	June 25 to Aug. 3 .	12,764

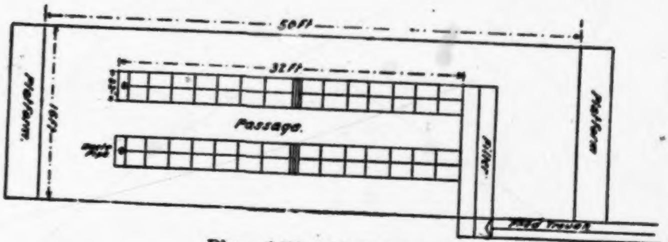
As the stream was not fished to any extent in 1886 and 1897, the average for the intervening ten years would be about 41,700.

KLAWAK HATCHERY.

Realizing the value of Klawak Stream to the cannery, and the importance of the natural spawning conditions in the lake and its feeders, the managers determined to try to improve the catch by operating a hatchery. Accordingly, in May and June, 1897, a hatchery, with a dwelling for the attendants, was erected on the right bank of the outlet, close to the lake and immediately below the upper rapids. The western end of the lake narrows so gradually that it is difficult to tell where it ends and the outlet begins, but the first or upper rapids seem to be the natural line of demarcation. Here the stream is from 150 to 200 feet wide, and falls and tumbles about 10 feet in a cataract, immediately below which the hatchery site was selected. The water was conducted in a wooden trough from the lake above the rapids to the building, which was built from the bank out over a side eddy or widening of the main stream, so that a slight current flows under the building.

The hatchery is a substantial board structure, 50 feet by 16 feet, stripped over the joints to make it tight, and shingled with spruce shingles. It is lighted with five windows facing the timber and entered by a door at either end, from which a platform leads to the shore. The hatchery fixtures consist of 8 troughs, 16 feet long by 16 inches wide, placed in pairs, each 2 pairs end-on, so that there are 2 sets of troughs running 32 feet in length, broken in the middle, the 2 lower pairs in each set being 4 inches lower, allowing that much fall to the water for aeration.

The water is conducted from the lake above the rapids in a V-shaped trough to the upper end of the building on the river side, and, after passing through a large sluice box packed as a filter and running across the heads of the hatchery troughs, is conducted through them. These troughs are made of planed lumber well coated with asphalt varnish, with sheet-iron partitions also coated with asphalt, and are so arranged as to give sufficient space for handling the baskets and to permit the circulating water to pass under the partition at the head and over the one at the foot, thus percolating through the eggs; that is, there are two partitions separating each basket compartment. The upper partition extends to the bottom of the trough and is of such height as to allow the water to flow over the top. The lower one is of such height as not to permit the water to flow over it, but is raised from the bottom of the trough so that the water flows under. They are regular Williamson troughs.



Plan of Klawak Hatchery.

On the bottoms of the troughs are small sheet-iron rests, varnished, which permit the baskets to rest upon them and clear the bottom by about 1 inch. The troughs have compartments for 56 baskets. The latter are of woven wire, 7 parts to the inch, and are 24 inches by 14 inches by 5 inches. The number of eggs placed in each basket here is 50,000, giving the troughs a capacity of 2,800,000. As the passageways are very wide, the capacity of the hatchery could very easily be increased a half, making it 4,200,000. The waste water is returned to the stream by iron pipes at the foot of the troughs. The hatchery was ready for work July 25. Early in July the first redfish were seen in the lake, and on July 25 fish were seen in the trap at the mouth of Half-mile Creek. On August 1 a ripe female was captured and stripped, and from that day there was a gradual increase in numbers until September 10, when they were at their height and 60 females were stripped. The last stripping took place September 14. Early in September heavy rains set in, causing the highest floods known at the cannery, and washing out the traps so that no fish could be obtained after the 14th. It is believed that under average conditions many ripe fish could be obtained after that date.

The males first arrived in considerable numbers, followed closely by the females. It was noticed here, as in Redfish Bay, that there were more males than females. The total number of eggs taken during the season was 2,023,000, of which number about 800,000 were hatched and the fry returned to the lake. There were about 4,000 eggs to the fish. The small percentage hatched was due to fungus, inexperience and the high temperature of the water in the lake being factors. Of the eggs fertilized on August 1 the eye-spots appeared in 18 days, and a few were hatching out September 13, but died immediately. The first fish to survive hatched out September 16 (47 days), and the first were planted on October 12. A short season of very warm weather raised the temperature of the surface water abnormally. When the temperature was taken it was 65°, and it is believed to have been much higher.

After the first set of eggs had been in the trough about a week a slime or fungus gathered on the wirework of the baskets, the eggs sticking together and dying. At this time the water was carried to the distributing trough and thence through the hatchery troughs direct from the lake. A distributing trough for one set of baskets was then packed for a filter with coarse gravel and charcoal, and then layer by layer with finer material to the top, and at the time of my visit the second distributing trough was being prepared in the same manner. This filter relieved the slime or fungus somewhat, but did not stop it altogether.

The appliances in the Klawak hatchery seem all very good, and the methods are those usually adopted at standard stations.

The eggs for the hatchery were obtained from fish taken at the Half-mile Stream and at the Three-mile Stream, on the northern side of the lake. The former has its source in two small lakes and empties into the large lake by a short delta in three arms. It is accessible to fish for about a mile, when it flows over a fall too high for fish to ascend. On the day of our visit the stream was much swollen by the heavy rains; two of the arms were about 30 feet in width, and the third 25 feet, with an average depth of 18 inches. Under average conditions there is very little water flowing in any but the middle arm, and at its mouth is a trap of stakes bound together, elliptical in form, the long diameter touching the banks at the extremities. On the lake side it is arranged in two places with circular openings having stakes pointed inward and converging like the opening in a rat trap, allowing the fish to enter, but not to leave. The fish entering here and impounded are removed by a dip net and, if ripe, they are stripped at once and the eggs fertilized; if not ripe, the fish are returned to the lake. The fertilized eggs are then carried by boat to the hatchery and placed in the hatchery troughs.

The Three-mile Stream also empties through a delta, but is much larger than the Half-mile Stream. It rises in the mountains, a large part of the water flowing over a high cascade. The water is clear and pure, and of an even, low temperature summer and winter. It has a gravel bottom and a large supply of fish. The redfish spawn in this stream for a long distance, and the hatchery in the summer of 1897 drew largely upon it for its supply of eggs. A trap similar to the one described has been placed here.

The stream at the head of the lake has not been thoroughly tested, but it is known to be large and that redfish spawn in it in numbers. It flows from a chain of lakes.

All these streams have ideal bottoms for nesting, and in my opinion the natural conditions for spawning can not be surpassed. There are few, if any, localities in southeast Alaska so well adapted for a hatchery site. If the Government should ever desire to establish a hatchery in this region it is believed that here the greatest success could be obtained with the least expenditure of money. Not only are the natural conditions superior, but by an easy trail the lake is only 2½ miles distant from Klawak, which has a monthly mail.

SAR-KAR AND VICINITY.

Sar-Kar is on the western side of Prince of Wales Island, at the lower end of Shakhine Straits, above the village of Tuxecan, and about 40 miles from Klawak. The stream is claimed by Mr. Fred. Brockman, who lives here, operates a small saltery, and sells fish fresh to Klawak cannery. The price varies, but about 4 cents is paid per fish, the cannery steamer calling for them. Mr. Brockman salts a few humpback bellies (300 half-barrels in 1897) and such other fish as are not called for by the cannery steamer. The average number of fish delivered to Klawak from this stream is 16,000 redfish and 9,300 cohoes. These numbers represent the capacity of the stream.

The following is the record so far as it can be obtained:

Year.	Redfish.		Cohoes.	
	Dates.	Number.	Dates.	Number.
1887	July 3 to Aug. 4	6,476		
1888	June 28 to July 11	6,834		
1889	July 3 to Aug. 30	11,555	Aug. 7 to Sept. 8	14,528
1890	July 6 to Aug. 16	16,267		
1891	June 23 to Aug. 21	35,033	July 25 to Sept. 6	15,331
1892	June 24 to Aug. 19	24,024	Aug. 19 to Sept. 10	9,033
1893	June 24 to July 30	9,797	July 27 to Aug. 23	4,700
1894	July 7 to Aug. 2	12,678		
1895	June 26 to Aug. 31	11,636	July 21 to Sept. 4	3,830
1896	June 18 to Aug. 2	20,480	Aug. 2 to Sept. 2	9,643
1897	June 25 to Aug. 17	21,667	Aug. 17 to Sept. 1	8,207

Warm Chuck is a stream in the vicinity of Tuxecan, and some years furnishes as many as 8,000 redfish.

Tok-Hehe and Ka-Hehe are other small streams in the same locality, from which 1,000 to 2,000 redfish were taken some years ago.

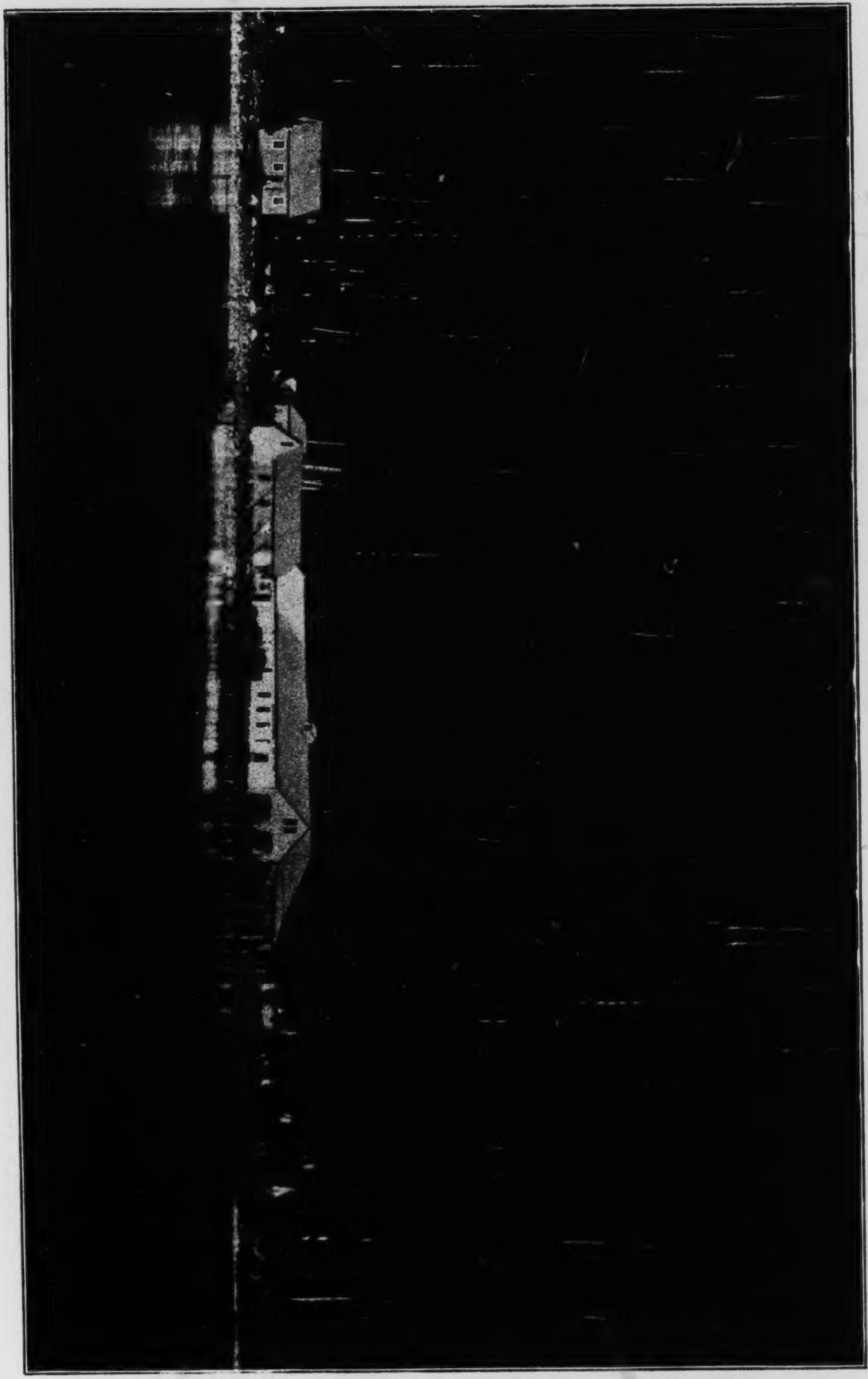
Eeke, Sukkwan, Kassook, Klakas, and Hessa, from which some years ago fish were obtained for the Klawak cannery, have been described.

The cannery steamer with a fishing crew visits the smaller streams in the vicinity where no regular fisheries are established and makes the catch by means of drag seines. Traps have been tried in the inlet at Klawak; one was driven in 1897 at an expense of $2,000, but without success warranting the outlay. Gill nets have also been tried, but with very little success.

REDFISH BAY.

Redfish Bay is on the western coast of Baranoff Island, about 58 miles south of Sitka. The head of the bay opens out and affords good anchorage for moderate sized vessels, and at its extreme end is the cannery of the Baranoff Packing Company. This company built a cannery at the Redoubt, about 12 miles below Sitka, in 1889, and operated it that year and in 1890. It was then moved to its present location on Redfish Bay, making the first pack there in 1891. It has been operated every year since its organization, and has a capacity of 500 cases a day.

In 1896 and 1897 the cannery employed 17 natives as fishermen, and 3 whites and 31 Chinese in the cannery. They used 2 drag seines, 125 fathoms long, valued at $1.50 per fathom. One steamer, the *Wigwam*, of 24 net tons, with a crew of 5, and valued at $10,000, was employed. A chartered vessel transported the outfit in the spring and the pack in the fall. Four seine boats were used, valued at $75 each. The cannery is valued at $12,000, which includes buildings and machinery.



CANNERY AT REDFISH BAY.

The following table gives the pack for 1896 and 1897:

Species.	Dates.	No. of fish.	Cases packed.	No. of fish per case.
Redfish	June 22 to Aug. 20, 1896	103,541	9,338	11
Cohoes	Aug. 15 to Sept. 25, 1896	10,825	2,157	5
Humpbacks	July 19 to Aug. 31, 1896	....	3,863	23
Redfish	June 27 to Aug. 28, 1897	64,509	4,058	11
Cohoes	Aug. 2 to Sept. 14, 1897	8,351	1,576	5
Humpbacks	July 19 to Sept. 1, 1897	....	8,436	23

Though the average number of fish per case in 1897 is given the same as for 1896, it seems much higher for redfish, on account of the large number of fish from Necker Bay, which run as high as 30 to the case, and have not been considered in the average.

The Chinese contract was at 44 cents per case; the fishermen were paid $1.75 per day and board. As there is the same trouble here in holding the native labor throughout the season, $1.50 is paid and the remainder reserved until the end of the season, when, by contract, it is forfeited if the native leaves without permission.

The cannery is small, having an output slightly less than that of Klawak. It has no regular fishing stations and purchases fish only incidentally. The steamer goes from stream to stream where it is believed that fish may be obtained, and when loaded it returns to the cannery. If a stream is found having a good run of fish, a seining gang is left there. The streams are scattered over a territory fished by no other cannery, and range on the outer coast from Cape Ommaney to Cross Sound and on both sides of Chatham Strait from Icy Straits to Cape Ommaney. It is one of the hardest fishing routes in Alaska. The streams all lie in unsurveyed districts, and as a rule are small and uncertain. A stream that yields 4,000 to 5,000 redfish one year may not have enough the next to feed a native family. A stream in Chatham Strait, fished by this cannery, was prospected secretly and independently one year with great success by different parties. The following year they met at the mouth of the stream with big outfits, neither previously knowing the other's intentions, and where there had been thousands of fish the year before, there were not enough to salt a dozen barrels.

The cannery is at the extreme end of Redfish Bay, which runs north-northwest and south-southeast. The mouth of the home stream is west from the cannery about 300 yards.

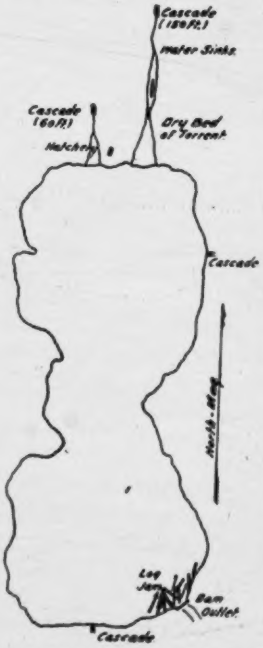
REDFISH BAY STREAM.

This is a lake outlet and flows from the lake in a general east-southeast direction over a rocky bed, with considerable velocity. The stream is about half a mile long, and the width between banks is 50 feet, though at the time of our visit it did not flow more than 8 inches deep at a point where it was 20 feet wide. There are numerous low falls and rapids, but none which prevent redfish or cohoes from ascending, though it is doubtful if humpbacks or dog salmon enter the lake. From appearances the volume of discharge varies largely.

The lake is hour-glass-shaped, and has a greatest length of 1½ miles in a north-and-south direction, with a greatest width of ½ mile at the southern end. Except at the outlet, the lake is hemmed in by very precipitous mountains from 800 to 1,500 feet high, in some places rising nearly vertically 600 or 800 feet. On approaching the northern end, however, it is seen that the mountains lie a short distance back, leaving a rising wooded shelf a few hundred yards wide, except on the eastern side where the dry bed of a torrent appears in a narrow canyon, which extends back about a mile and ends in a cul-de-sac.

The lake is fed by a number of cascades, several of them very beautiful. There is absolutely no stream flowing in over a bed in which fish can spawn. The cascades either tumble directly into the lake or by a series of short waterfalls. At the head of the lake on the eastern side are the several dry, bowldery beds of a torrent, previously alluded to, which form a junction about a quarter of a mile from the lake, and then continue as one bed, except where the stream in its flood has met some obstruction and has torn its way through by several channels, carrying everything before it.

About half a mile from the lake a considerable flow of water falls over a log jam into a pool, where it is swallowed up. Advancing farther, the stream increases in volume and the mountains come close together, until the bed is hemmed in by a narrow gorge, and one looks up vertically to the top of the mountain. In one place there is a sheer fall of 800 to 1,000 feet. About a mile from the lake the gorge ends, and the stream falls over the comparatively low gap in a beautiful cascade about 150 feet high. The rise from the lake to the cascade is about 1 to 10. The question is, What becomes of the water? On examination it is seen that huge slides from the surrounding mountains are not infrequent, and that the timber bordering the bed of the torrent grows upon the detritus; in fact, the whole shelf at the upper end of the lake is of the same material—great angular blocks, grading down to finer material. Great trees, torn up by the roots and piled in with rocks carried down, are scattered everywhere; bowlders piled up in fantastic shapes—all show the violence of the torrent. Trees that have been thrown across the stream and jammed have great hollows pounded in the upper surfaces by the rocks as they are swept onward by the current. This shelf, then, consists of these angular blocks; they are not waterworn, and there is no large amount of fine material. This formation probably extends to a considerable depth, and in the bed of the stream it permits the water to percolate through the interstices and find its way by seepage into the lake. When the stream is at its flood the volume is too great to sink away, and it flows into the lake as a torrent over what was a dry bed at the time of our visit.



Sketch of Redfish Bay Lake.

Under such conditions the redfish must spawn in the lake, and the cannery foreman, who winters here, states that he has frequently observed them spawning on the shelf off the dry bed of the torrent, making no nests. This shelf is poorly adapted for spawning-beds. It is only a few yards wide when it drops off into deep water, and is composed of rocky material that could not be used for nesting. The peculiar conditions that prevail here in reference to these spawning-grounds are exceedingly interesting, from the fact that redfish not only spawn in the lake, but under conditions entirely different from those usually believed to be necessary. Yet the stream can be relied upon for redfish, and a large number are taken very year in the vicinity of its mouth, or on the fishing-ground; the average catch during seven years was 34,903, the largest number, 69,553, being taken in 1894. At the point selected for spawning-beds the salmon are under the influence of the water seeping through under the dry bed of the torrent, which is probably of different temperature and conditions from the lake water.

At the head of the lake, on the western side, several streamlets discharge from a cascade that spreads over the face of a vertical rock a few hundred yards back from the shore line. On the lake shelf at this point the cohoes spawn, and if the streamlets are swollen they work their way into the mouths, where small pools are formed. The water level of the lake varies greatly, and when the cascades freeze the lake falls, and, as the cohoes spawn so high up on the lake shelf, their eggs are exposed and lost. To remedy this a dam was constructed in 1897 across the outlet at the lake end, with a central opening about 6 feet wide. After the fish are all up, and before the cascades freeze, it was the intention to close the opening of the dam, so that the lake may be held at a level sufficiently high to keep the eggs covered.

Hatchery at Redfish Bay.

The run of redfish here usually extends late in the season. During the time of our visit (September 5 to 8) some of them taken in gill nets looked as if they were just in from the sea. The cannery could have made large hauls at this time, but care has been taken not to overfish, so as to have as many fish as possible enter the lake. The foreman stated that in 1896 he first noticed red salmon spawning on November 3, and from that time they were seen in large numbers until December 2; after that date only occasional ones until Christmas, and after that none were seen. The cohoes, though much later to run, commenced spawning October 3, continuing into January.

The company operating the cannery, appreciating the value of the home stream, and desiring to increase its output, built a hatchery during the summer of 1896, and finished it in time for experimental work in the fall of that year. The hatchery is located at the head of the lake, between the dry bed of the torrent and the streamlets flowing from the cascade, and near the latter. It consists of a log and rough-board building, 20 by 30 feet, shingle-roofed, having at one end a room partitioned off for the superintendent's quarters, and in the space at the other side of the same end, a boiler and pump were installed in 1897.

There are eight hatching-troughs, each 16 feet long, 12 inches wide, and 11 inches deep, made of unplaned and unpainted boards, 1 inch thick and 12 inches wide. They are arranged in three pairs and one against the wall, on either side of the building, leaving four passageways between them. There are six compartments in each trough, 30 inches long, separated by solid wooden partitions 6 inches high, joined tightly to the bottom and allowing the water to flow only over the top. In each compartment are two ⅛-inch round iron rods, fixed transversely ¼-inch from the bottom, for the baskets to rest upon. The baskets are 24 by 10½ by 6 inches, and hold about 25,000 eggs.

Water from the cataract, a few hundreds yards back of the hatchery building, is conducted by a box flume to the northeast corner of the hatchery building into a transverse distributing-trough, from which it passes through the hatching-troughs, and thence by a waste-pipe out of the building. The arrangement of the partitions allows only circulation over the top. There was no record kept of the operations in the fall of 1896. About one week after they had commenced to gather eggs, and had 200,000 in the baskets, unexpected cold weather set in and not only froze the flume solid, but froze up the whole cataract. Being without water, the eggs were put in the lake and left to their fate. It was the intention for 1897, in the event of a freeze, to pump from the lake and use a filter. The water from the cataract is about 8° lower in temperature than the lake water. The fish are taken from the lake in seines, and those that are ripe are stripped, while the rest are returned to the lake.

The following is the record of Redfish Bay Stream since 1890:

Species.	Year.	Dates.	Number.	Species.	Year.	Dates.	Number.
Redfish ..	1890	July 18 to Aug. 24 .	24,367	Redfish ...	1895	June 28 to Sept. 21.	40,969
Do....	1891	July 9 to Sept. 26 ..	*53,310	Do.....	1896	June 1 to Aug. 10 ..	15,000
Do....	1892	July 6 to Aug. 6 ...	48,000	Do.....	1897	June 1 to Aug. 10 ..	20,000
Do....	1893	July 14 to Sept. 2 ..	26,434	Cohoes ...	1893	Aug. 21............	303
Do....	1894	July 29 to Aug. 12 .	69,553	Do.....	1895	Aug. 26 to Sept. 21 .	1,512

*Includes a few cohoes.

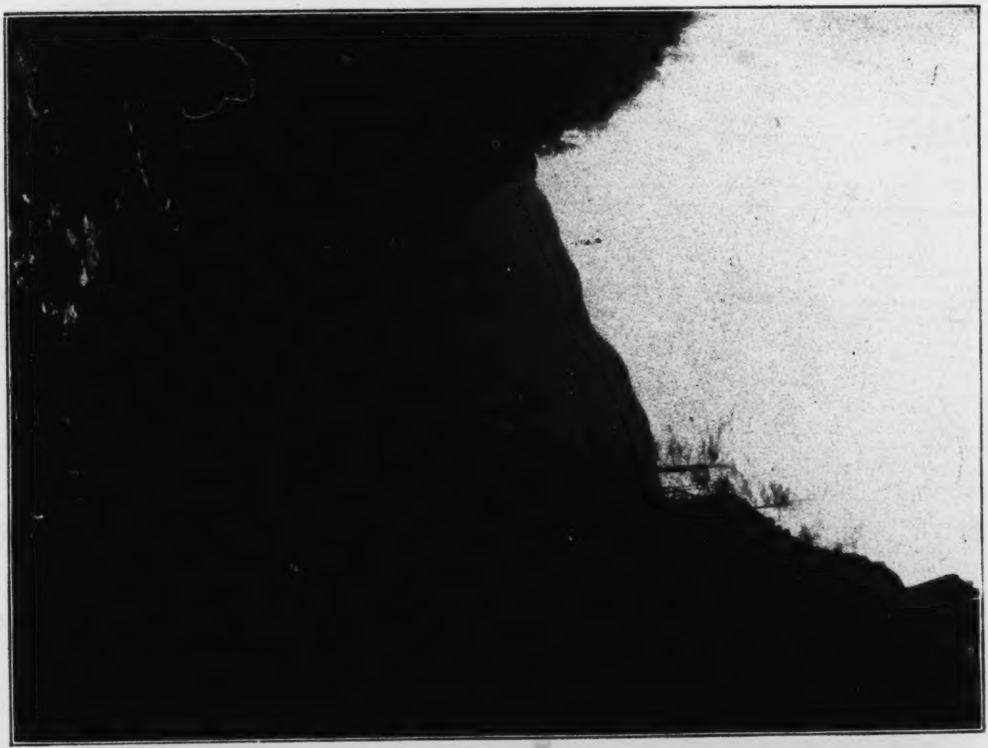
VICINITY OF REDFISH BAY, ETC.

Little Whale Bay, about 20 miles to the northward of Redfish Bay, has a stream from which 2,000 to 3,000 redfish and the same number of cohoes are taken.

Necker Bay, next north of Whale Bay, has a stream which is remarkable for the large run of *small* redfish. The average number of fish per year taken from this locality by the cannery during the past nine years is 40,000; the largest number in any one year was 105,572. They are fully matured, I am told, and run from 28 to 30 to the case. This would give an average of rather less than 2½ pounds in weight, and it is asserted that every year the fish average about the same in weight.

The Redoubt, referred to under the cannery history as the first location of this cannery, has a short outlet to a large lake and was a favorite place of the Russians and the principal source of salmon supply for the Sitka colony. It was dammed solidly for years, and from a stream out of which many thousand salmon were formerly taken each year, the catch has dwindled down to about 6,000.

PLATE 47.



GORGE AT HEAD OF REDFISH BAY, LEADING TO LAKE.

CASCADE NEAR HATCHERY, REDFISH BAY.

Cape Edward, Smith, Olsen, and O'Hara bays are on the outside of Chichagof Island, and Surge Bay is on the outside of Yakobi Island. All are unsurveyed localities, from which a few redfish are taken for Redfish Bay cannery.

Sitkoh Bay, Gut Bay, Falls Creek, Point Ellis, Kuiu Bay, Shipley Bay, and Point Barrie in Chatham Strait are localities from which a few redfish are caught for the same cannery. All these streams should be examined; probably none of them are of much importance; still the negative evidence may be of value. It is said that formerly many of these streams were barricaded, but that they are now all open.

ASTORIA AND ALASKA PACKING COMPANY.

A cannery was built by this company in 1889, in Pavlof Harbor, Freshwater Bay, on the eastern side of Chichagof Island. Messrs. Sanborn & Ellmore, of Astoria, were the promoters of the enterprise. It made a pack in that year, and in the spring of 1890 was moved to the South Bay of Pillars (Point Ellis), on the eastern side of Kuiu Island, packing that year and also in 1891. It was burned in May, 1892. The cannery was located on the southern shore of the bay.

The streams fished for this cannery were the following:

The home stream, known usually as the Point Ellis Stream, at the head of South Bay of Pillars, from which in 1891 the cannery obtained 35,000 redfish, 5,000 cohoes, and 100,000 humpbacks.

Pillar Bay Stream is at the head of the North Bay of Pillars, and is said to have furnished the cannery in 1891 with a large number of cohoes and humpbacks. A small saltery is now located here and operated by Mr. Jack Mantle.

Near the head of Tebenkof, or Kou Bay, is a stream usually known as Kuiu Stream, which in 1891 furnished the cannery with a large number of redfish, cohoes, and humpbacks. A few fish were also taken from several small streams on Baranof Island, and from Sitkoh Bay on Chichagof Island, none of which were visited.

Baranof Island has a number of streams in which redfish are found, but except Redfish Bay and Necker Bay they are said to be unreliable, and at best carry a very limited number. This is also true of Chichagof. Frequent inquiries were made about Admiralty Island, but only two redfish streams were heard of, and these are doubtful.

This country has all been prospected over, and it is thought that the streams are fairly well known; but a further visit to all these localities should be made, so that some definite knowledge in relation to them may be on record.

KILLISNOO.

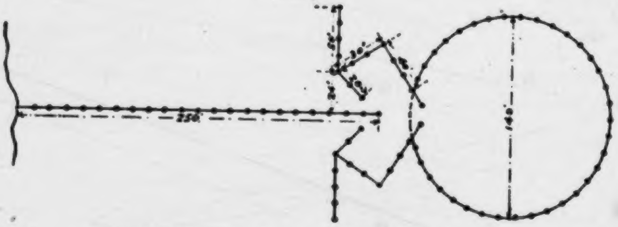
Killisnoo is on the northeastern side of Kenasnow Island, close to the western shore of Admiralty Island, opposite Peril Straits, and about 3 miles south of the entrance to Kootznahoo Inlet. It is a regular calling-place for the steamers of the Pacific Coast Steamship Company. It has a post office, store, Government school, and a Greek chapel. In 1890 the regular population was 79. The works of the Alaska Oil and Guano Company, incorporated with a capital stock of $75,000, are located here. The business of the company is to extract the oil from the herring and convert the refuse into guano. Incidentally a few salmon and herring are salted.

In 1880 Messrs. Spuhn & Vanderbilt came to Alaska, operating under the title of the Northwest Trading Company, for the purpose of establishing stores for trade with the natives. One store was located at Killisnoo, an old Hudson Bay Company station.

As herring were plentiful in the inlet at Kootznahoo, a small plant was installed in 1882 for extracting oil, simply in an experimental way, and as it proved successful it was gradually enlarged until its present capacity is said to be 1,800 barrels of herring in twenty-four hours, or 350,000 gallons of oil, 1,500 tons of guano, and 1,000 half-barrels of salt herring for the season. As prices are now low, the works are not run to their full capacity. In 1884 the plant for the manufacture of guano was installed and operated. In 1888 the Northwest Trading Company, which also built the Pyramid Harbor salmon cannery in 1883, went into the hands of trustees, and the present company was organized.

The works are quite extensive, the buildings large, machinery excellent, storehouses roomy, wharves commodious, and the plant similar to the menhaden oil works on the eastern coast. The common barrels used are made on the place by machinery.

The steamer *Dolphin*, of 60 tons net register, valued at $10,000, with a crew of 18, including fishermen, is used for cruising through interior waters for fish. The steamers *Favorite* and *Louise* operate in the inlet with scows, using 3 purse seines, 125 to 150 fathoms long, 12 fathoms deep, ½-inch stretched mesh, valued at $1,000 each, fully rigged. The *Favorite* is 42 tons net, and is valued at $5,000; it has a crew of 16, including fishermen, viz, 6 whites, 9 natives, and 1 Chinese cook. The steamer *Louise* is 5 tons net, valued at $3,000, and has a crew of 3. Three lighters, worth $800 each, and 8 seine boats, valued at $125 each, besides numerous skiffs, etc., are employed. This year a trap was driven in the inlet, but at the time of our visit it had not proved satisfactory. In and about the factory 17 whites, 35 natives, 3 Chinese, and 5 Japanese are employed.



Sketch of herring trap at Kootznahoo Inlet.

The white fishermen are paid $50 a month, and board; the native fishermen get $1.50 a day, or practically $45 a month, for they are paid even if detained, and while board is not stipulated they practically get it. Laborers generally have $1 a day, but about 10 of them, who have been employed a long time and are faithful, having the more difficult work to do, receive $1.50 per day. Boys are paid 50 cents a day. A good native fisherman or laborer makes about $200 a season. All wages are paid in cash, the company disbursing $10,000 to $15,000 a year to the natives and the few white men who make Killisnoo their home.

The factory is ready for operation from July 1 to December 31.

A barrel of herring weighing 200 pounds contains from 700 to 800 fish. The price of pressed oil is 30 cents a gallon, crude oil 25 cents a gallon, the refuse of the pressed oil 20 cents a gallon. The guano brings from $25 to $27 per ton. The oil goes largely to San Francisco, New York, and England, and is used for tanning, the manufacture of soap, and adulterations. A considerable portion of the guano is sold in Hawaii.

During the spawning season the herring are very poor and furnish no oil; it is not until June, when their food appears, that they commence to fatten. In that month one barrel of herring will furnish about half a gallon of oil, sometimes less; from this time the oil increases until the early part of September, when about 3½ gallons of oil are obtained from one barrel of fish. It then decreases, and in December a barrel of fish will furnish about 2 gallons of oil.

One hundred barrels of herring make 2½ tons of dry fish-guano. This is simply fish refuse dried in retorts after the oil has been extracted, and containing 8 to 10 per cent of moisture.

In 1896 the output was as follows: From 27,750 barrels of herring there were made 90,650 gallons of oil and 550 tons of guano. This is the smallest output of oil since the second year of operation. 250 half-barrels of herring, 25 barrels of salmon, and 150 half-barrels of salmon bellies were salted.

At the time of our visit the oil and guano works were running to their full capacity, and the statistics for 1897 could not then be obtained. Later it was learned that the catch for 1897 amounted to 35,000 barrels of herring, from which 125,000 gallons of oil were prepared, valued at 25 cents per gallon, 780 tons of fish fertilizer valued at $27 per ton, and 950 half-barrels of salt herring valued at $3.50 per half-barrel. The season was poor, owing to stormy weather.

The herring of southeast Alaska are small, but in season are rich in oil and of delicious flavor. They are found in many localities running in immense schools, some years in smaller numbers, in fact almost disappearing where formerly they were abundant, and appearing in localities not visited before, only to return after several years to their former feeding-grounds. As herring are food for other fishes, and as it is said of these fish that they are found where the bait is, so it may be said that herring go with *their* bait, which is said to be a small crustacean occurring in some places in myriads.

In April the herring come to the shores in countless numbers to spawn, depositing their eggs in the sea grass, rockweed, and on the bushes hanging in the water. At this time the Indians plant hemlock twigs at the low-water mark, where they become covered with spawn, after which they are gathered in canoe loads. The spawn is heaped upon the twigs, to which it adheres in grapelike clusters, which are sometimes called "Alaska grapes," and is consumed by the natives in large quantities, either fresh or dried, and cooked as occasion demands, and for winter use. Usually it is eaten with rancid oil, which is the sauce that goes with all their delicacies, even with berries.

For many years the inlet at Kootznahoo has been the favorite resort for herring, though lately they seem less abundant. They are found in great numbers on the northern shore of Kuiu Island and at times many are taken in the vicinity of Juneau. The steamer *Dolphin* cruises through all the interior waters and makes a catch wherever herring are found. Cetaceans, halibut, king salmon, and other fish follow the schools and consume immense numbers.

The Indians use the herring only during the time they are present in their waters, curing none for winter food. In catching them for their own use a long stick or pole having at the end, and for some distance from it, a large number of sharp-pointed nails, is swept through the water, with a paddle-like motion, like a rake, impaling the fish on the nails. At the end of the movement the pole is brought over the canoe, given a shake which detaches the fish, and then thrust into the water again. In this manner a canoe load is quickly made.

The following is the output of the company since its first operations at Killisnoo:

Year.	Oil.	Guano.*	Herring.	Year.	Oil.	Guano.	Herring.	Salted.		
								Herring.	Salmon.	Salmon bellies.
	Gallons.	*Tons.*	*Barrels.*		*Gallons.*	*Tons.*	*Bbls.*	*Half bbls.*	*Barrels.*	*Half bbls.*
1882	30,000	None.	No record.	1890	156,750	None.	52,425	....	....	....
1883	81,000	None.	42,000	1891	242,050	800	88,222	....	....	....
1884	192,000	600	66,000	1892	318,900	700	93,580	....	....	....
1885	300,000	No record.	85,000	1893	223,450	900	72,250	....	....	....
1886	368,000	No record.	110,000	1894	234,350	800	76,530	1,000	....	†50
1887	335,000	No record.	111,000	1895	101,650	500	32,550	500	....	....
1888	100,000	No record.	30,000	1896	90,650	550	27,750	250	25	150
1889	157,900	None.	52,400	1897	125,000	780	35,600	950	105	275

*The amount of oil and guano made depends upon the demand; some years there was no market for guano.
† Salt codfish.

The following shows the output of salted salmon for 1897:

Species.	Number of fish.	Average weight.	Price paid for fish.	Product.	Price received.
		Pounds.			
King salmon	350	16	1 cent per pound, live weight.	25 barrels	$10.50 per barrel.
Redfish	6,000	6½	5 cents each	75 half-barrels of bellies	$6 per half-barrel.
Cohoes	2,500	10	1 cent per pound	80 barrels	$8 per barrel.
Humpbacks	22,000	3½	1 cent per fish	200 half-barrels of bellies	$5 per half-barrel.

The redfish and humpbacks salted here are purchased from Indians, who take them with seines in the small streams in the vicinity, the redfish from the middle of June to the beginning of August, and the humpbacks from July 15 to August 15. The king salmon and cohoes are taken entirely by trolling. An ordinary salmon hook, baited with fresh herring placed lengthwise over the hook, is used. The best results are obtained near the schools of herring. The king salmon seem to follow and feed upon them, and can be taken at all times when the herring are in, but they are more abundant in certain months. In April and May they are plentiful enough for local consumption. Salting is commenced in June, and continued throughout July and August, or until the herring run in such large numbers that all the force must be employed in making guano and oil. The king salmon, however, continue abundant and are taken, though in diminishing numbers, until January. There is no record of the capture of any in February, but several have been caught in March, and they can probably be taken every month in the year; but in the late winter, when everything is covered with snow and ice, no attempt is made to catch fish in any way. All king salmon taken here are in prime condition. A number seen on September 20 appeared as though fresh from the sea. The spawn was not advanced toward ripening, and the stomachs were full of herring. It is said that on the herring ground on the northern side of Kuiu Island, when the steamer is lying to, waiting for the fish to school, king salmon are captured at times in considerable numbers on an ordinary hand line baited with herring. In October, from the wharf at Killisnoo, king salmon from 10 to 12 inches long are frequently taken with hand lines (without sinkers) baited with herring. In Florence Bay, inside of Point Hayes, on the opposite shore, the Indians take large numbers of small king salmon on hand lines during the fall of the year.

Cohoes are also taken on trolls, but the season is short, usually from July 15 and throughout August.

Codfish are found in the vicinity of Killisnoo, but not in paying numbers. The company has sometimes salted 50 barrels a year, from the latter part of May to the

PLATE 48.

CANNERY AT PYRAMID HARBOR.

15th of August. Several years ago preparations were made to take codfish on a large scale, but the venture was unprofitable. It is believed that with a large equipment, and fishing over a wide area, 50 tons might be taken in a season.

Only very general information could be obtained at Killisnoo in reference to the salmon streams in the vicinity, and an investigation of the localities will be necessary to determine their importance.

BARTLETT BAY.

This is an arm of Glacier Bay, on Icy Straits. In 1890 a cannery was built on the bay by the Bartlett Bay Packing Company, and operated by Williams, Brown & Co., of San Francisco. A saltery was conducted here prior to that date, and in 1889 a pack of 4,300 cases was made in a crude way. Cans were carried to the locality, cookers improvised, and the pack was made by hand. In 1890 the cannery was built, and a pack made that and the following year, but none subsequently. The cannery entered the pool of the Alaska Packing Association of 1892, and was one of the canneries of the Alaska Packers' Association in 1893. In 1894 it was dismantled, the buildings were pulled down, and the place abandoned.

CHILKAT.

A long narrow peninsula projects into the head of Lynn Canal, forming two bays or inlets. The eastern one, called Chilkoot Inlet, again divides, the western arm receiving Chilkoot River; the eastern arm continues about 10 miles farther to the northward under the name of Taiya Inlet, and has at its head the villages of Dyea and Skagway. The western arm, or bay, of Lynn Canal, called Chilkat Inlet, receives the waters of the Chilkat about 9 miles from Seduction Point (the end of the peninsula).

In 1880, when it appeared that the salmon of the Columbia were becoming scarcer, with no adequate steps to restock the river, Mr. M. J. Kinney, then and now one of the large packers on the Columbia, started inquiries elsewhere with reference to future business. In 1882 he had the Chilkat territory prospected for fish, built a hut at Pyramid Harbor, and in 1883 he erected a cannery, under the name of the Chilkat Packing Company, on the eastern shore of the inlet, about a mile below the site now occupied by the cannery of the Chilkat Canning Company. A pack was made that year. The cannery changed hands several times, and finally was burned in 1892, and not rebuilt. The site is now owned by the Alaska Packers' Association. The cannery packed every year from 1883 to 1891, both inclusive, except in 1888, when it was closed.

A cannery known as the Chilkat Canning Company was built in 1889 by Messrs. Hugh Murray and David Morgan at Chilkat Village, on the eastern side of the inlet, and inside of Pyramid Island. It was operated from 1889 to 1893, and then sold to the Alaska Packers' Association and closed. It has not been operated since 1893, but is held as a reserve by the association. It has a capacity of about 800 cases a day.

PYRAMID HARBOR.

Pyramid Harbor is on the western side of Chilkat Inlet, 1½ miles south of Pyramid Island, and consists of a small cove in which two or three vessels may find anchorage. The cannery of the Pyramid Harbor Packing Company is on the southern shore of the cove. It was built in 1883 by the Northwest Trading Company, at the time that company was established at Killisnoo, and operated in 1883 and 1884. It was idle in 1885, and in 1888 was sold to D. L. Beck & Sons, of San Francisco, and operated by that firm. In the spring of 1889 it was burned, but was rebuilt at once and a pack was made that year. In 1892 the cannery was a member of the Alaska Packing Association, operated that year, and in 1893 it joined the Alaska Packers' Association. It was afterwards enlarged, utilizing some of the machinery of the Bartlett Bay cannery. It is the only cannery that has made a pack in this vicinity since 1893. It has a capacity of 1,600 cases a day.

In 1896 14 whites and 87 Chinese were employed in the cannery. The company employed 60 white fishermen, and received fish from about 200 natives. The cannery fishermen used 12 gill nets, each 200 fathoms long by 16 feet deep, 8½-inch mesh, valued at 65 cents per fathom, for king salmon, and 46 gill nets, each 300 fathoms long by 10 feet deep, 6¼-inch mesh, valued at 65 cents per fathom, for redfish. The steamer *Elsie*, of 38 tons, with a crew of 5, and valued at $16,000, and the steamer *Lillian*, of 20 tons, with a crew of 4, valued at $8,800, were employed. The chartered ship *Invincible*, of 1,394 net tons, with a crew of fishermen, was used for transporting. Four lighters valued at $50 each, 48 Columbia river boats valued at $200 each, and several skiffs were also used.

The following table gives the statistics for 1896 and 1897, so far as obtainable:

Species.	1896.			1897.			
	Cases packed.	Average number per case.	Dates.	No. of fish.	Cases packed.	Average number per case.	Dates.
Redfish	44,044	10.3	June 25 to Sept. 12	321,517	31,241	10.3	June 25 to Sept. 13
Cohoes	612	7.5	Aug. 28 to Sept. 12	11,123	1,489	7.5	Aug. 29 to Sept. 13
King salmon	2,800	3.1	May 25 to June 25	14,796	4,727	3.1	May 28 to June 28

In 1897 the same equipment was used. At the beginning of the season the same number of white fishermen was employed, and the fish were received from about 300 natives. After the gold excitement reached Pyramid Harbor many white fishermen left for the Klondike and many Indians left to freight across the passes.

The Chinese contract price was 40 cents per case. The fish obtained for this cannery, as well as for those others that had previously operated here, all came from the Taku, Chilkat, and Chilkoot rivers.

TAKU RIVER.

The Taku River is one of the largest of southeast Alaska, and empties into the inlet of the same name about 12 miles southeast of Juneau. King salmon, redfish, and cohoes run in the river, but on account of the wide expanse of the mouth, and the ice in the inlet, which is discharged constantly from the adjacent glacier, fishing can not be carried on profitably. The river is said to be navigable for canoes for a distance of 50 miles. It has a strong current and many tributaries, some of which are said to be lake outlets. As soon as the ice breaks up in the river (usually about May 25) the fishing for king salmon commences, and all that are packed at Pyramid Harbor are taken in the Taku, except a few stragglers that appear around the Chilkat very early in the season, which can hardly be called a run. The cannery usually expects to pack about 3,500 cases. These fish are all taken with drifting gill nets by white fishing crews. About 15 per cent of the king salmon are white-meated. The largest ever taken weighed 78 pounds. No other species are fished for in the Taku.

As soon as the redfish commence to run (usually about June 25), the king-salmon fishing ceases and the gear for redfish is put out, not because the king salmon stop running at that time, but because the redfish are more profitable.

CHILKAT RIVER.

The Chilkat River comes after the Stikine, Taku, and Unuk in size. It empties into the head of Chilkat Inlet over the extensive McClellan Flats. Canoes go some distance above Klukwan, the largest and principal Chilkat village. The Chilkat, while draining an extensive glacial region, has no tide-water glaciers around its mouth, and therefore is not obstructed by ice during the summer. The lower river valley is large and wide, but the water at ordinary stages is confined to a few channels, which flow around sand banks and marshy and wooded islands. The river proper has its source in the high ranges to the northwestward, near the headwaters of the Alsek. At Klukwan, about 20 miles above its mouth, the Chilkat receives as a tributary the water of the Tsirku, an outlet to Chilkat Lake. The lake is 5 miles long, and its greatest width is 1 mile. Its feeders are said to be spawning-beds for large numbers of redfish.

Most of the redfish are taken by the cannery fishermen with drift gill nets. Columbia river boats are used, each manned by two white men, or one white man and one native. The fishing is carried on in Chilkat Inlet between Glacier Point and McClellan Flats, a range of about 7 miles. The average catch for the season by the cannery fishermen during the past four years has been 300,000 redfish. The fishermen receive $100 for working the ship to Alaska and return to San Francisco, and 3 cents is paid the boat outfit for each king salmon, redfish, or coho taken; the men are boarded by the cannery. The cannery, besides obtaining fish from this source under its own supervision, purchases fish from the Chilkat and Chilkoot Indians.

The Indians fish from canoes moored to posts, or from platforms built over the streams. They use a large gaff (common among all Alaska Indians), consisting of an unbarbed hook about 4 inches across the bend, secured to a pole 10 or 12 feet long. This is thrust into the water, and when the Indian feels or sees a fish, he impales it and drags it ashore. When fish are plentiful the hook is simply dragged through the water. A large number of the fish from the Chilkoot are taken in this way.

CHILKOOT RIVER.

Chilkoot River empties into the head of Chilkoot Inlet and is the outlet of Chilkoot Lake. It is about 1½ miles long in a general northwest-and-southeast direction, and is one of the smaller streams of Alaska, but has a large run of redfish. The lake is about 2½ miles long and 1 mile wide, and is fed by glacial streams. More redfish are taken at Chilkoot than at Chilkat, as the fish are confined to a single broad channel and are more easily captured. The Chilkoot may be classed with streams like Hetta, Karta Bay, and Naha Bay. In 1896 the run of fish in this stream was so large that the cannery was obliged to limit the number purchased of each Indian fisherman to 100 per day.

The Chilkoot Indians supplied the Pyramid Harbor Cannery in 1894 with 62,284 redfish; in 1895 with 68,000; in 1896 with 159,000; and in 1897 with 48,000. The Chilkat Indians furnished 30,872 in 1897, this being the first year since 1893 that they supplied any fish. Four years ago they demanded 10 cents a fish, and as the cannery refused to pay this amount, the Indians declined to furnish any fish. In 1897 a compromise was effected, the cannery steamer calling at the mouth of the Chilkoot and paying 6 cents a fish. The Chilkats deliver at the cannery and receive 8 cents a fish.

The small number taken in 1897 is due to the Klondike excitement. Most of the Indians stopped fishing and went to Dyea and Skagway to freight over the passes. About half of the white fishermen also left for the gold fields.

From the large number of redfish taken in Chilkat Inlet it is probable that the river is a very prolific redfish stream, but it is so broken in its course that fishing is very difficult. The earliest fish are a few king salmon, followed, the latter part of June, by the redfish, which continue running until late in September, when the dog salmon come in so thick and the redfish decrease to such an extent that it is barely profitable to take them. The humpbacks also run in large numbers in September. The Chilkat redfish are regarded by packers as the choicest in Alaska.

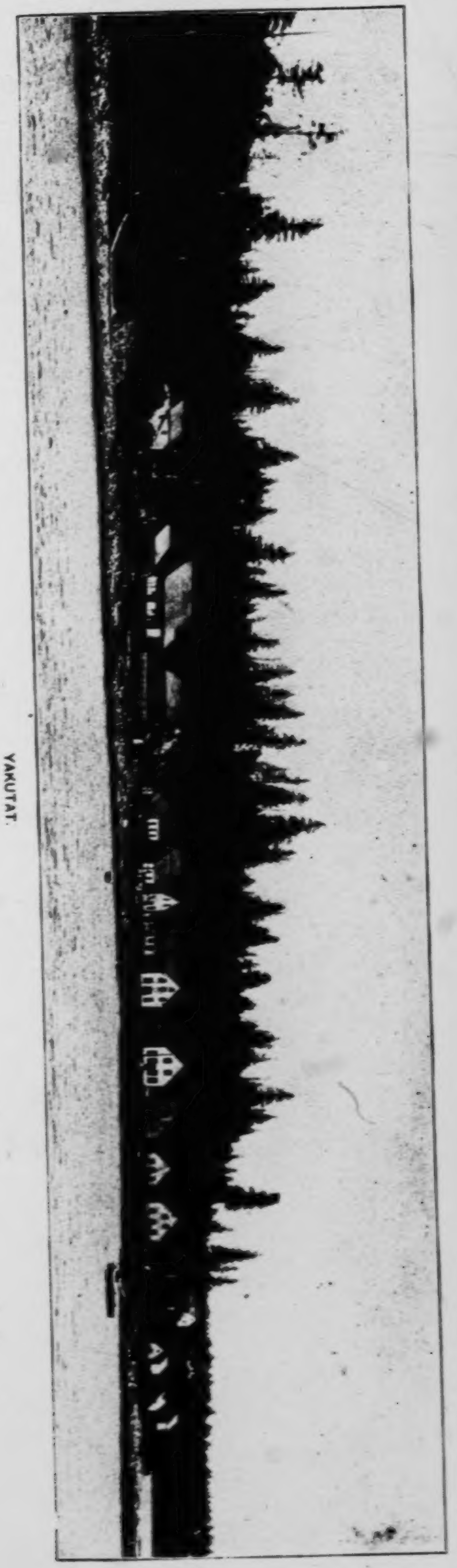
The run in the Chilkoot begins a little later than in the Chilkat. The redfish in both streams are about the same average weight and size, but fishermen claim that they can recognize a difference in shape, and it is stated that a Chilkoot fish is very rarely found on the Chilkat side of the peninsula, and vice versa.

Seines have been tried unsuccessfully, probably because there are no good seining beaches.

A sturgeon was taken in the Taku in 1896 weighing 12 pounds, and one in the Chilkat the same year of similar weight. No steelheads have been noticed, but Dolly Varden trout are numerous during the season.

It was learned from white people in the vicinity that the Indians also use nets in both rivers, blocking all the channels and entering streams, in all directions, to make the catch, and that they fish on the spawning-grounds. It was also reported that not only is Lake Chilkoot fished, but the spawning stream as well, and that traps have been placed in the lake under the guidance of an expert. The gill-net fishermen are reported not to observe the weekly close season.

With the Chilkat region the examinations conducted in 1897 by the *Albatross* in southeast Alaska were finished. They include all the canneries and a number of the fisheries, but there are still a large number of streams to be examined in the future. There are said to be redfish streams entering Swanson Harbor, Bartlett, Dundas, and Taylor bays, Idaho Inlet, and Port Althorp. Probably none of these streams contain many redfish, otherwise the cannery at Bartlett Bay would not have been abandoned. At Port Althorp there was a saltery operated by Ford & Stokes, now said to be abandoned. At the southern entrance to Cross Sound is Yakobi Island, separated from Chichagof Island by Lisianski Strait. Surge Bay makes in to Yakobi Island on the western shore, and has a stream fished some years by the Redfish Bay cannery, from which as many as 16,000 redfish have been taken. South of Point Urey is a large sound or strait, with numerous arms, bordered by islands, rocks, and reefs, on the ocean side of Chichagof Island. On this sound are Stranger River, O'Hara Bay, Olsen Bay, and Smith Bay, having redfish and coho streams, and fished at times by the Redfish Bay cannery.



YAKUTAT.

KILLISNOO.

PRINCE WILLIAM SOUND AND COPPER RIVER REGION.

After leaving Chilkat there are no canneries until Prince William Sound is reached, or, as the locality is sometimes called, the Copper River Delta. As plenty of capital is ready to be placed in canneries, this long stretch has probably been well investigated. The absence of canneries would seem to imply the absence of fish, but the inaccessibility of the region probably accounts for the slight development of its fishery resources.

The district has contributed 6.6 per cent of the cannery output of Alaska since 1889. Its share in 1897 was 5.7 per cent.

The *Albatross* called at Yakutat to make inquiries relating to the fisheries, but little information could be obtained. This village contains about 300 Indian inhabitants, and lies on the seaward slope of the great Fairweather Range and the St. Elias Alps. The Indians obtain all their fish supply here, from a few small streams in the vicinity. They speak in glowing terms of the abundance of fish, but without any conception as to the numbers necessary for commercial purposes. There are several glacial streams emptying into Yakutat Bay, and all are said to carry king salmon. The fisheries are, however, entirely undeveloped, and it would take at least a season's work to make even a partial examination of the waters.

About 60 miles east of Yakutat the Alsek River empties through a delta into Dry Bay. According to the Indians, this river carries a large number of king salmon, redfish, and cohoes. Between the Alsek and Yakutat four smaller rivers empty into lagoons or inside channel-ways which communicate with the sea through shallow channels, and all are said to contain many salmon in season. It is said that a canoe can be carried through these inside channels from Yakutat to the mouth of the Alsek, but there is no entrance seaward for a vessel. The combined catch of these rivers would perhaps be sufficient to supply a cannery, but their inaccessibility is an obstacle to success.

Little is known of the fishing resources from Yakutat to Cape Suckling. Several streams flow into the sea along this line of coast, but they are probably inaccessible. In 1889, when twenty additional canneries were built in Alaska, four were located in the vicinity of the Copper River Delta, but only two are now in operation.

LITTLE KAYAK ISLAND.

In 1889 a company known as the Central Alaska Company built a cannery on Wingham or Little Kayak Island (also known as Mitchell Island), about 15 miles west from Cape Suckling. The cannery made a pack of 1,600 cases that year, and the following spring it was moved to Thin Point, on the southern side of Alaska Peninsula. It operated during 1890 and 1891, and was absorbed by the Alaska Packing Association of 1892 and closed, and in 1893 it joined the Alaska Packers' Association, but was no longer operated. In 1895 the available machinery was moved to Koggiung, on the Kvichak River, in Bering Sea, and utilized as a part of the plant of the Point Roberts Packing Company.

The Peninsula Trading and Fishing Company built a cannery on Little Kayak Island in 1889 and packed 2,540 cases that year, and 14,200 cases in 1890. In the fall of 1890 and spring of 1891 it was moved to one of the sloughs of the Copper

River Delta, known as Coquenhena, and operated under its former name, making a pack in 1891. It joined the Alaska Packing Association in 1892 and was closed, but for some reason it did not join the Alaska Packers' Association of 1893. Since 1893 it has been operated by the Pacific Steam Whaling Company. A change in the channel of the slough has made it difficult of access, and the cannery was closed in 1897. The machinery has been removed, and it is said that such as is available will be installed in the new cannery built in 1897 at Kenai, Cook Inlet. It had a capacity of about 1,200 cases a day.

The Peninsula Trading and Fishing Company employed 40 white fishermen, 20 white cannery-hands, and 60 Chinese in 1896. Ten gill nets were used, each 100 fathoms long by 24 meshes deep, for king salmon, and 20 gill nets, each 200 fathoms long by 30 meshes deep, for redfish—all valued at $1 per fathom. The vessels employed by the company were the stern-wheel steamer *Thlinket*, of 30 tons, with a crew of 5, and valued at $10,000, and the launch *Beaver*, of 5 tons, with a crew of 3, and valued at $4,000. The ship *America*, attached to the Orca cannery, was used in transportation. Two lighters, valued at $200 each, and 20 Columbia River boats, valued at $200 each, were also operated.

The pack of 1896 was 20,558 cases of redfish, 10 to the case, from May 20 to July 25, and 114 cases of king salmon, 2.5 to the case, from May 20 to June 1.

ODIAK.

In 1889 Messrs. Louis Sloss & Co., of San Francisco, built a cannery under the title of Pacific Packing Company, at the extreme eastern end of Prince William Sound, on the mainland east of Hawkins Island and on the northern side of a mud slough separated from Lake Eyak by a narrow neck of land, about three-fourths of a mile wide, and now called Odiak. This cannery has been operated every year since except 1892, when it joined the Alaska Packing Association and was closed. In 1893 it entered the Alaska Packers' Association, and is now operated by that organization. It has a capacity of about 1,500 cases a day.

In 1897 the Pacific Packing Company employed 64 whites as fishermen, and 7 whites and 66 Chinese in the cannery. The nets used comprised 32 sets of gill nets, 450 fathoms per set, worth $1 per fathom—9½-inch mesh for king salmon, 6½-inch mesh for cohoes, and 6¼-inch for redfish. The vessels and boats employed were the screw steamer *Pacific*, 32 tons, crew 6, valued at $14,000; the stern-wheel steamer *S. B. Mathews*, 165 tons, crew 6, valued at $14,000; the stern-wheel steamer *Susannah*, 18 tons, crew 6, valued at $9,000; one lighter worth $250; 32 Columbia River boats worth $200 each, and 2 seine boats valued at $100 each. The ship *Centennial*, 1,139 tons register, worth $20,000, served as a transport, with a crew of fishermen.

The 1896 statistics for equipment were practically the same as for 1897, except that the chartered bark *Gatherer*, 1,377 tons, was used as a transport.

The following gives the statistics of the output of the Pacific Packing Company for 1896 and 1897:

Species.	1896.				1897.			
	Total number of fish.	Dates.	Cases packed.	No. of fish per case.	Total number of fish.	Dates.	Cases packed.	No. of fish per case.
Redfish	282,138	May 10 to Aug. 30	29,500	9.6	170,116	May 6 to Aug. 10	13,315	12.7
Cohoes	1,953	Aug. 9 to 27	217	9.				
Humpbacks	217,120	July 8 to Aug. 24	9,910	22.	239,430	July 5 to Aug. 6	9,784	24.5
King salmon	817	May 6 to June 14	216	3.8	905	May 6 to June 13	202	4.8

CANNERY AT ORCA.

The difference in the average number of fish to the case for the two years is due to waste. The number of fish received is the cannery count, and in the case of redfish, in 1897, a large number was rejected, and probably the same was the case with the humpbacks in 1896. When the pack of a species is small, the number consumed by the cannery-hands and salted, though counted as part of the catch, makes a large difference in the number to the case.

ORCA.

The Pacific Steam Whaling Company in 1889 built a cannery on the southern side of the same mud slough on which the Pacific Packing Company located at Odiak, and nearly opposite the latter company's establishment. In the spring of 1895 it was moved to a more salubrious site on the mainland, now known as Orca, east-southeast from the northern point of Hawkins Island, and about 4 miles north of its former location. This cannery has been operated every year except 1892, when it entered the pool of the Alaska Packing Association and was closed. It did not join the Alaska Packers' Association in 1893. It has a capacity of about 1,500 cases a day. In 1896, 60 white fishermen were employed, and 25 whites and 65 Chinese in the cannery. The Chinese contract was 42 cents per case, and in addition the tester received $40 a month and the boss $50 a month. Thirty sets of gill nets were used, 350 fathoms to the set, valued at $1 per fathom; mesh, 9½-inch for king salmon, 6½-inch for cohoes, and 6¼-inch for redfish. Three seines, each 150 fathoms long, valued at $1 per fathom, were also used.

The company, in 1897, employed 86 white fishermen and 17 whites (including a doctor), 6 natives, and 81 Chinese in the cannery. The fishermen used 43 sets of gill nets, 450 fathoms per set, 9½-inch mesh for king salmon, 6½-inch for cohoes, and 6¼-inch for redfish, all valued at $1 per fathom.

Three steamers were employed in 1897, the *Wolcott*, 199 tons net, crew 9, value $25,000; and the *Wildcat* and *Thlinket*, both stern-wheel, 50 tons each, crew 5 each, and valued at $10,000 each. The ship *America*, 1,909 net tons, with a crew of fishermen, was chartered. Two lighters valued at $250 each, 43 Columbia River boats at $200 each, and 3 seine boats at $100 each were also used. The equipment statistics were about the same in 1896 as for 1897, but only 30 Columbia River boats were used in 1896 instead of 43, and the steamer *Thlinket* was used by the Peninsula Trading and Fishing Company, and the *Wolcott* had not been purchased.

The following table gives the statistics of the pack of the Pacific Steam Whaling Company at Orca for 1896 and 1897:

Species.	1896.				1897.			
	No. of fish.	Dates.	No. of cases packed.	No. of fish per case.	No. of fish.	Dates.	No. of cases packed.	No. of fish per case.
Redfish	222,157	May 15 to July 31	23,445	9.5	201,371	May 13 to July 31	21.197	9.5
Cohoes	29,909	Aug. 13 to Sept. 14	4,021	7.5	25,605	Aug. 14 to Sept. 12	3,414	7.5
Humpbacks	91,060	July 9 to 26	4,855	18.7	62,880	July 9 to Aug. 5	3,415	18.7

A few king salmon were taken each year, but these were packed with the redfish. In 1896, 285 cases of redfish were packed in May, 13,785 in June, and the remainder in July. In 1897, 3,600 cases of redfish were packed in May, 14,486 cases in June, and the remainder in July. The cohoes are packed up to the closing of the cannery, and run much later, though not in paying quantities.

In 1896, 3,000 cases of redfish were taken in seines in Prince William Sound and the remainder in gill nets from the Copper River Delta. Of the cohoes, half were taken in seines and half in gill nets.

The Indians say that after the cannery closes there are plenty of fish.

The terms of the Pacific Steam Whaling Company with their fishermen are as follows: Of the number employed, 20 are paid $40 each for taking the vessel with the outfit from San Francisco to the cannery, and back in the fall with the pack. From the beginning of the fishing season until it closes, each fisherman receives $15 per month and board, and the cannery pays to each boat outfit (2 men) 3 cents each for redfish and cohoes, 10 cents for king salmon, and $5 per 1,000 for humpbacks.

Fishermen to make good wages should take 10,000 fish to a boat (2 men) during a season, and this catch was formerly quite frequent, but large catches are very rare now, and there is much complaint among the fishermen. In 1890, with 150 fathoms of web they could average from 7,000 to 8,000 fish to a boat, and now with 450 fathoms of web they barely average half that number.

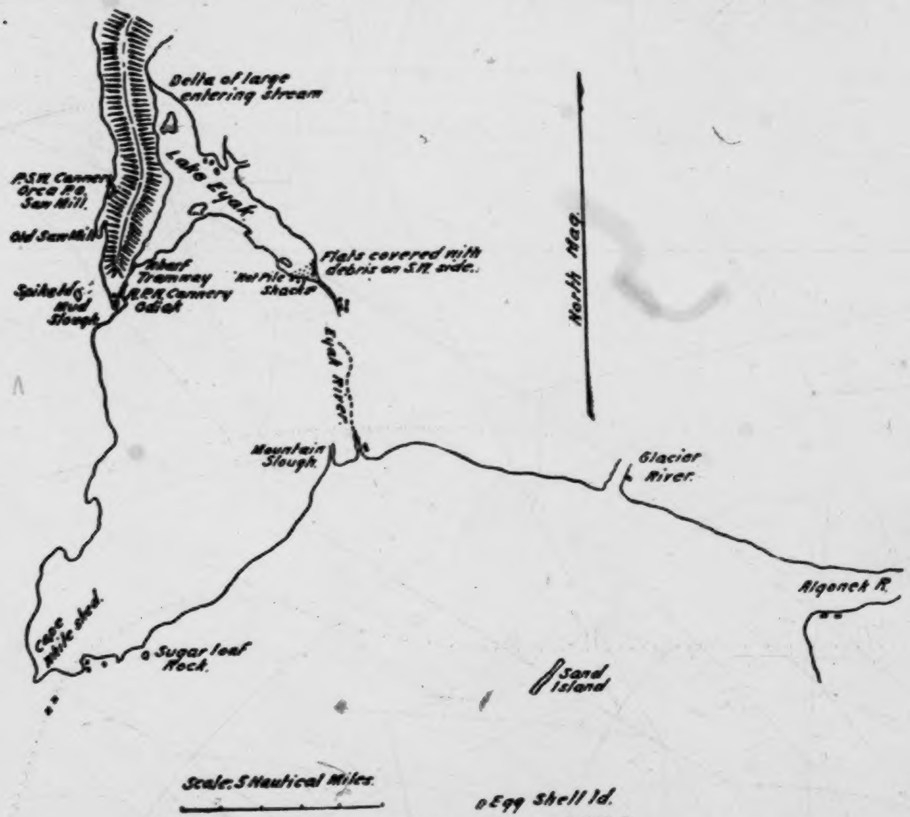
As these two canneries at Orca and Odiak were built the same year, have operated during the same periods, and fish over the same localities, the remarks in reference to the fishing are applicable to both. The fish are taken in two entirely different sections, differing but little in distance, yet widely in their runs and fishing methods. The canneries are located on the dividing line separating the two sections and are accessible to both. Rounding Cape Whiteshed to the eastward extends the Copper River delta, which is the gill-net fishing-ground, similar to the fishing in the large rivers of Bering Sea, while to the westward extends Prince William Sound which represents the drag-seine fishing, a counterpart of southeast Alaska, with its many small streams, each affording a few fish.

In 1889 the two canneries on Little Kayak Island drew their fish from the Copper River delta and the rivers in the vicinity of Little Kayak. In 1890, after the removal of the Central Alaska Company to Thin Point, the Peninsular Trading and Fishing Company made its pack from the same source. After its removal to Coquenhena, and until dismantled in 1897, its fish supply came from the Copper River delta.

The first pack, about 20,000 cases in 1889, was made by the two canneries at Odiak almost entirely from the lake and river at Eyak. In 1890 the fish were obtained from Eyak Lake and River, Mountain Slough, a branch of the latter, Glacier River, and Algonek Slough in the delta, and from Miner's River and Cheniga in Prince William Sound. As fish became scarce, fishing operations were extended as far eastward as Chilkhat River (not to be confounded with the Chilkat River at the head of Lynn Canal) a distance of about 75 miles by steamer; to the westward all the streams in Prince William Sound were reached, a run for the steamers of from 85 to 90 miles. The main source of supply, however, now comes from the Copper River delta, which includes Eyak River on the west and Chilkhat River on the east, though neither takes its source from the Copper River.

The great flats that make offshore between Point Steel and Kayak Island have no doubt been formed by the detritus from the Copper River, and are usually spoken of as its delta.

The first stream along the shore eastward from the canneries is Mountain Slough, an outlet or slough of Eyak River, having its mouth in the corner of the bight formed by the headland, of which Cape Whiteshed is the terminal point, and the mainland extending to the westward from Copper River. About a mile to the eastward is the mouth of Eyak River, the main outlet to the lake; 5½ miles farther east is Glacier River, and the same distance beyond is Algonek Slough, the first or western slough of Copper River. After that come Pete Dahl Slough, Big River, Coquenhena, Cottonwood Point, Little River, Gus Wilson Slough, and Marten River, all sloughs of


Delta of large entering stream
Lake Eyak
P.S.R. Cannery Orca P.O. Saw Mill.
Old Saw Mill
Wharf Tramway
Net Pile Shacks
Flats covered with debris on S.E. side.
Spike Id.
Mud Slough
R.P.R. Cannery Odiak
Eyak River
North Mag.
Mountain Slough
Glacier River
Algonek R.
Cape Whitshed
Sugar loaf Rock
Sand Island
Scale: 5 Nautical Miles
Egg Shell Id.

Sketch of Vicinity of Orca and Odiak.

Copper River. The distance from Glacier River to Marten River is about 40 miles by steamer. About 15 miles to the eastward of Marten River is Chilkhat River, which is an outlet to two or more lakes and is the easternmost stream now fished by the canneries.

COPPER RIVER.

Copper River, about 20 miles from the marshes forming the coast line, breaks into a delta and discharges its waters through numerous sloughs, the principal ones being those just mentioned. The tide ebbs and flows for a long distance through the sloughs, and they not only receive the river and tidal waters, but in addition those sloughs bordering the highlands and mountains receive the discharges from small lake outlets and glacial streams. It is probable that few except king salmon ascend a great distance up Copper River proper, finding their spawning-beds in the lower tributaries. Bordering the delta, and as far as Point Steel on the west and Kayak on the east, are great sand and mud flats extending from 3 to 6 and more miles from the shore and marshes. Most of these flats are dry at low water, but they have channel-ways through them seaward from the larger sloughs, and shallow channels and pools between them which admit the passage of light-draft stern-wheel steamers. It is probable that Copper River originally discharged into a large irregular bay, which gradually filled and formed the present delta, and the flats outside are merely the foundations for its farther expansion seaward.

The conditions here admit gill-net fishing only, which is done by drifting with Columbia River boats, 2 men and 450 fathoms of web constituting an outfit. There are stations or bunk-houses at different points within the sloughs, where the fishermen live and from which the catch is taken to the canneries by the small stern-wheel steamers calling for them. These steamers, of which there are two at each cannery, have a draft of 24 inches and navigate the shallow waters of the delta. At low water they are frequently aground.

The king salmon packed at the canneries are obtained in the delta, and commence to run about May 6; scattering ones are taken all summer. While this pack has never been very large, the catch has decreased rapidly during the past few years, and to such an extent that in 1896 some of the interior Indians were reported to be on the verge of starvation on account of this scarcity of king salmon, which forms a large item of their food. In 1897 there was great rejoicing among the Stick Indians when they heard that the cannery at Coquenhena would not be operated. It seems hardly probable, in a locality where the natural conditions permit only fishing by gill nets, that the fishermen should have caused this decrease, yet it is said that the nets are placed at such short intervals that they lie almost back to back and side by side.

The following catches of king salmon, from the books of the Pacific Steam Whaling Company, show the number taken per year by one cannery:

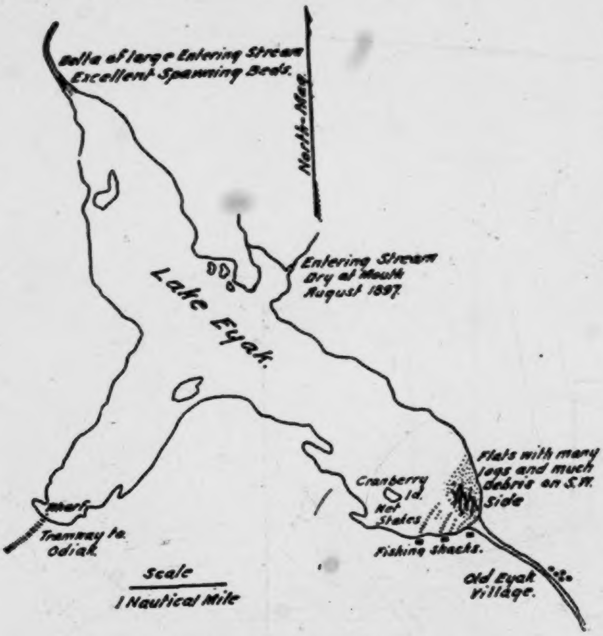
Year.	Dates.	Number.	Year.	Dates.	Number.
1890	May 5 to June 30	5,401	1894	May 11 to June 30	4,494
1891	Apr. 27 to June 30	6,185	1895	May 8 to June 29	5,929
1892	Closed		1896	May 15 to June 30	590
1893	May 2 to June 30	8,674	1897	May 10 to June 30	1,049

The mud slough on which both canneries were originally located is less than half a mile in length and inaccessible at low water. During the packing season, when the mud banks are covered with salmon offal and refuse, they become very foul, and were it not for the myriads of gulls which act as scavengers, it is difficult to see how any one could live in the locality.

Three-fourths of a mile distant from the cannery at Odiak, in a general northeast direction over a low neck of land, is the head of the southwest arm of Lake Eyak. A tramway from the cannery extends to this point and terminates on a small wharf on the lake shore. The lake is T-shaped; that is, there are three arms, each widening toward the junction and extending in northwest, southwest, and southeast directions respectively. These arms are about 2½ miles long with an extreme width of about a mile, with the main body or junction much enlarged. The shore line is rocky, the banks are heavily wooded, and in places are high and steep where they run directly into the mountain masses. There are many places which are quite shallow, rocky in some instances, and with gravel and sand bottom in others. The surface of the lake is on a level with the highest tide; indeed, tide water sometimes backs into the lake. It is fed by a number of cascades and streamlets, with one large, rapid stream discharging through a delta at the head of the northwest arm, and a small stream, which during the dry season loses itself through the marsh and gravel, on the northeast side of the lake directly opposite the southwest arm. At the western side of the southeast arm is the lake outlet. It flows in a general south and southeast direction for a distance of from 5 to 6 miles, with a width of 200 feet, emptying into the sea on the western side of the delta of Copper River.

The banks of the outlet (Eyak River) are generally rocky, with projecting, wooded ridges, though in places they are of clay, and grassy. The current at low water is strong, but at high water slack, and at the highest tides it is an inflowing stream. About 3 miles from the lake the river receives from the eastward the whitish waters of a glacial stream of considerable size, and below this point a slough, before referred to as Mountain Slough, opens from the main river and carries some of the water in its own channel, discharging about a mile to the westward of the river.

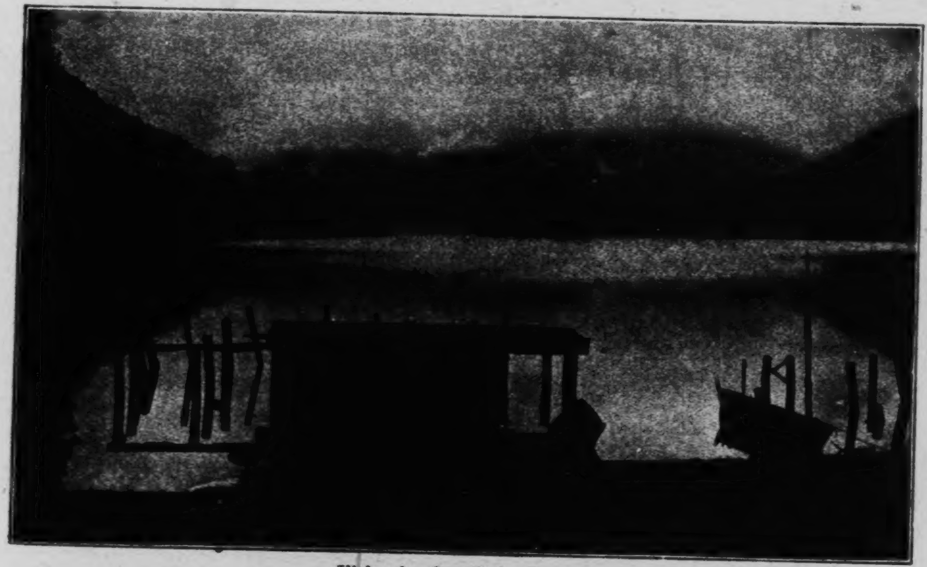
For several years Eyak River and Lake formed a highway for lighters and the smaller vessels engaged in transporting fish from the delta. They were carried direct to the wharf at the head of the southwest arm, and thence shipped by tram to the cannery. It was found more economical, however, to run the steamers around Cape Whiteshed, direct to the canneries, and no fish, except those carried by small boats, are now transported by way of Eyak Lake and River. The newer stern-wheel steamers have been built much larger, and it would be hazardous to use them on the former route.



Sketch of Lake Eyak.

The large entering stream at the head of the northwest arm of the lake discharges its whitish snow, or glacial waters, into the lake through a delta in which the larger streams are from 25 to 35 feet wide, and several feet deep, flowing with a rapid current over sandy and pebbly beds; the banks are pebbly, bare in some places, covered with grass in others, and the growth of trees and shrubs increases as the streams are ascended. It seems an ideal spawning-ground, vast in extent, and with abundance of water, yet very few salmon were seen. The party, perhaps, did not ascend high enough to find the actual spawning-beds, but in any event there should have been large numbers of dead fish encountered; not above a dozen, however, were seen, only enough to show that they do go there. Possibly the water is too cold, yet the few fish seen would indicate that it is not, and this scarcity of salmon may be owing to the wanton fishing of the lake. On the northeast shore is a small stream which, during the time of our visit, had no flow of surface water; large pools stood in the gravelly bed. Around the mouth a few dead fish were seen; in fact, the lake nowhere showed an abundance of salmon.

On the western bank of the southeast arm of the lake, near the outlet, is an Indian's shack, and at the time of our visit a number of Indians were smoking and drying humpbacks and cohoes. Below the shack is a rather neat log cabin with drying racks for nets around it, and a short distance beyond is a board fishing-hut used for storing nets. In different parts of the lake stakes were projecting above the surface, and near the outlet they were especially numerous, their use being quite evident. Across the outlet at the lake and back for a distance of nearly half a mile were lines of heavy stakes running across the channel, to which gill nets are secured. These nets form an almost impassable barrier, and the wonder is that any fish ever get through to the spawning-grounds. Upon the arrival of the vessel no nets were found, but a few days before my visit an Indian trader from the Copper River district came to Orca for his winter-trade stock; he said in passing this point—the head of the outlet—the nets were so thick he thought he would have to cut them in order to gain a passage for his boat.



Fish-wharf on Lake Eyak.

LAKE EYAK.

Lake Eyak has been fished every year since the canneries have been in operation. The first year's pack was almost entirely from this source; but from a locality once good for 200,000 redfish—some say 250,000—it has dwindled down to 11,000 in 1897. Fishermen think that if the lake and river were not fished, the approaches to the mouth could be made to yield 25,000 redfish in a short time.

PLATE 51.

CANNERY AT LAKE EYAK.

From Lake Eyak the outlet flows a straight course for a mile in a south-southeast direction, and then turns about 1 point to the eastward. In this slight bend, on the left bank, the old native village of Eyak was located. It is now practically abandoned, the inhabitants having moved to Odiak, where they live in shacks and log-houses scattered along the line of the tramway. Quite a number of white men who fish for the canneries remain in the country all winter, not only here, but in Cook Inlet, Kadiak Island, and elsewhere, but there seem to be more here than at other places.

It is said that a few salmon are obtained by the Indians in Lake Eyak during the winter months. The water being very cold, it is probable that the cohoes do not spawn until very late, and the Indians may catch these fish, or possibly a few steelheads may run here at this time.

The natives in all parts of Alaska and the Aleutian chain prefer the fish well advanced toward spawning for their winter supply. In a country where the natives use rancid seal oil as a sauce for all delicacies, including strawberries and salmon berries, and bury salmon fresh from the sea for ten days or more to make them thoroughly ripe and palatable, and where a putrid whale carcass furnishes the choicest tid-bits, a salmon well-ripened under natural conditions might be thought the proper food to prepare for winter. The idea is, however, that when taken from the spawning-ground they are in poor condition from long fasting, and have very little fat or oil, so that the drying or smoking process is hastened.

PRINCE WILLIAM SOUND.

It is very difficult, in the absence of charts or maps, to describe the fisheries of this section. Time permitted only a survey of the waters in the vicinity of the canneries. The waters are entirely unsurveyed, extend over a large area, and are not well known. Chart B may give some idea of the situation.

The Copper River Delta, as before mentioned, is the principal source of fish supply for the canneries; the fish from Prince William Sound are simply an addition, and the total catch for all its streams would support only a very small cannery. The information regarding the streams of Prince William Sound was obtained from the cannery superintendents, masters of cannery steamers, and fishermen, modified somewhat by carefully examining records whenever there was opportunity.

The salmon streams of Prince William Sound resemble those of southeast Alaska, although as a rule they are inferior. The total catch for the whole district does not equal the catch of such streams as Quadra, Hetta, and others in a good season, and probably does not average over 125,000 redfish and 50,000 cohoes per season. The Pacific Steam Whaling Company's cannery has never exceeded 32,000 redfish and 35,000 cohoes per season from the sound. While there are many streams that contain humpbacks, they are not very plentiful in any one stream. In none do they run even as they do in the smaller streams of southeast Alaska, and they, as well as the redfish and cohoes, are decreasing yearly. In short, the district is poor in salmon, and the streams have been injured by injudicious and illegal fishing.

Nor are the canneries the only drains upon the salmon streams. The Treasury Department has leased certain islands in Prince William Sound and along the Alaska Peninsula to individuals and organizations for the purpose of breeding foxes, and thousands of salmon are cured annually for fox food.

The canneries at Orca and Odiak alone fish and have fished the streams of Prince William Sound for commercial purposes. Until 1897 they had a mutual agreement by which the streams of the sound were equally divided, and neither encroached upon the other's territory. In 1897, however, each cannery fished wherever it felt disposed.

STREAMS OF PRINCE WILLIAM SOUND.

After leaving Orca, rounding Hawkins Point, and passing through the narrows, on the starboard hand a large bay is seen making in to the northeast, known as Simpson Bay. It has several small arms and a few streams which combined are good for about 1,000 redfish, 2,000 cohoes, and a few humpbacks.

The next bay to the westward, making in to the northern shore, is known as Sheep or Jackson Bay. It has several humpback streams.

Next in order to the westward is a large bay known as Port Gravina, which is a deep indentation with several arms. At the head of the main body is a large stream which in good seasons will produce about 25,000 cohoes. There are two streams on the eastern side and three on the western side, all containing humpbacks. There are no redfish streams in the bay, but redfish sometimes school around the grassy flats on the western side. It is reported that the stream at the head of the bay is barricaded.

In Port Fidalgo are three humpback streams, and one of them also yields about 5,000 cohoes a year.

In Port Valdes are also three streams containing humpbacks, one of which carries cohoes.

Inside of Glacier Island is a stream known as Billy's Hole, from which in some years 20,000 redfish have been taken.

The next deep body of water westward is Salmon Sound, on the eastern side of which is Miner River, good for about 10,000 redfish. It is the outlet of two lakes, has been fished since the first year after the canneries were started, and has been continually barricaded. On the eastern side of Port Wells, inside of Esther Island, is a small stream which is also barricaded. It is capable of producing 3,000 redfish per year.

North of Point Nowell, and inside of an island and a line of reefs, is a small stream known as Rubber Boot, which can be relied on for about 3,000 redfish annually. It is barricaded.

Cheniga is between Rubber Boot and Point Nowell and has the largest run of redfish in Prince William Sound. In 1895 it furnished about 100,000, but a safe value is 50,000. It is said to be heavily barricaded.

Jack Pot is a stream that empties into the head of the third inlet southwest from Point Nowell. It is the outlet to a large lake system and can produce annually about 7,000 redfish.

Somerset River, on the eastern side of Knight Island, is a small stream. A few thousand redfish may be obtained from it annually.

Port Bainbridge has at its head an outlet to two lakes. The outlet carries redfish, but the product obtainable is unknown.

This completes the list of known salmon streams in Prince William Sound. As the cannery people are constantly striving to increase their packs, the steamers have prospected the locality very thoroughly, and it is believed that all the salmon streams of any value are known. The runs of fish are very uncertain, and as they vary largely from year to year, data of material value can not be obtained. No regular fishing crews are kept at the distant points; a stream is visited by a steamer and crew, and if fish are found schooling, the crew remain as long as a catch is made, visiting another locality if no fish are found.

Except Cheniga, the streams are all said to have small runs, and the pack of Prince William Sound fish is small. Fishing is done entirely by seines, but any and every device is used that will facilitate the catch. Fishermen and others interested do not deny that the streams are barricaded. The law exempts Prince William Sound from the weekly close season. Why this and some other places should be exempt is not understood, but from all reports one would also fancy that the sound was exempt from the provisions against barricading.

The following data were made up from the cannery books at Orca, and represent the runs of redfish and cohoes in Prince William Sound in numbers large enough to warrant fishing. A few run earlier and later, and in the case of cohoes it is probable that they run in considerable numbers after the cannery closes.

Year.	Redfish.		Cohoes.	
	Commenced running.	Finished running.	Commenced running.	Finished running.
1891	June 16	July 13	Aug. 4	Sept. 14
1892	Cannery closed.		Cannery closed.	
1893	July 1	No data.	Aug. 10	Sept. 15
1894	June 30	July 18	Aug. 14	Sept. 4
1895	June 21	July 7	Aug. 19	Sept. 1
1896	July 7	July 25	Aug. 13	Sept. 9
1897	July 11	Failure this year.	Aug. 11	Sept. 9

From Prince William Sound to Cape Elizabeth, the end of what is designated as the second district, there are no fisheries. There are very few inhabitants in this region, and little is known of its features. No streams having large numbers of salmon are known to exist anywhere in this vicinity, otherwise canneries would be established. The large bays on this broken and rugged coast probably receive the waters of numerous streams draining mountain slopes and glaciers, and all may carry some salmon. Future investigation alone can determine their commercial value.

COOK INLET DISTRICT.

This district extends from Cape Elizabeth to Cape Douglass. All the canneries that have been operated in Cook Inlet have been located on the eastern shore at two points, Kenai and Kussilof. In 1891 three canneries were in operation, but since that date only one.

The climate of Cook Inlet runs to extremes in the different seasons. The summers are comparatively mild and sunny, and the winters very cold, the extreme temperature reaching 60° below zero over the surrounding country. Across the Kenai Peninsula, in Prince William Sound, the summers are wet, and in the winter extreme cold is not experienced.

The Cook Inlet district is a very difficult one to fish. There are probably plenty of salmon to supply several canneries, but they are not only difficult to catch, but the fisheries and the conditions attending the serving of the canneries are extremely hazardous. The tides and currents in the inlet are strong and treacherous, increasing in height and force as its head is approached, where the tide comes in with a bore which is extremely dangerous to small craft. Nearly every season some lives are lost in the swift currents of Cook Inlet. The whole section is unsurveyed. Shoals make out a long distance from the shore, and are continually changing. When the cannery people return in the spring of the year they find the shoals and flats are much changed, and bowlders—sometimes of very large size—are noticed where they were not before, having been brought down by the large ice floes.

As frequent allusion is made to the very large king salmon taken in Cook Inlet, it may be mentioned that in 1897 the largest individual salmon ever known in the vicinity was caught at Kussilof; it weighed just 68½ pounds, and lost 21 pounds in dressing. It is said the flesh of the coho is a deeper red here than at other places, and there is a marked difference between the large and small redfish, the latter being much rounder.

The average pack of this district since 1882 is 6.5 per cent of the Alaska pack, and for 1897 it is 3.6 per cent.

KAKNU RIVER.

Kaknu River takes its source from Lake Skillokh, on the western slope of the Kenai range of mountains, and flows in a westerly direction for about 40 miles, emptying into Cook Inlet at Kenai, some 12 miles north of Kussilof. The river is said to have some large tributaries, and as a salmon stream has a greater value than the Kussilof. The cannery at Kussilof has three traps in this vicinity during the fishing season. The superintendent of the cannery, when asked as to the value of the two streams, said that they were both very uncertain; that the Kussilof ranged from nothing to 5,000 cases, and the Kaknu from 3,000 to 10,000 cases. The fish here average about 14 to the case. The Kaknu is undoubtedly the better stream, but the impression prevails that neither can be depended upon, and that it is exceptional to have a big run. Another authority stated that the Kaknu was good for 150,000 fish.

Kenai was a place of considerable importance in the earlier days. The Redoubt St. Nicolas, a stockaded post, was established by the Russians in 1789 and several trading

SALTERY AT HEAD OF UGANUK BAY, KADIAK ISLAND.

REAR VIEW OF CANNERY AT KUSSILOF, COOK INLET.

companies have been operated at this place. At present there is a small settlement of about 150 inhabitants.

The cannery of the Northern Packing Company was built in 1888 on the eastern side of Cook Inlet, at Kenai, at the mouth of the Kaknu River, 51 miles above Anchor Point. It was operated in 1888, 1889, 1890, and 1891. In 1892 it joined the Alaska Packing Association, and it became a member of the Alaska Packers' Association in 1893. It has been closed since 1891, and some of the machinery has been utilized in the plant at Kussilof, but it is said that the cannery is in such condition that it can be placed in running order at short notice. It is held as a reserve, and has a capacity of about 800 cases a day.

Buildings were completed for a cannery by the Pacific Steam Whaling Company at Kenai in the summer of 1897, near the cannery of the Northern Packing Company, but no machinery was installed. It was said that the machinery of the Coquenhena cannery was to be placed in this plant in the spring of 1898, and the cannery was to be operated that season. It will have a capacity of about 800 cases a day.

KUSSILOF RIVER.

The Kussilof River has its source in Lake Tustumena, a large body of water on the western slope of the mountain range that forms the dividing ridge on Kenai Peninsula, and flows in a general westerly direction through bottom lands and timber for about 25 miles, emptying into Cook Inlet at Kussilof. It is said that the lake is fed by bottom springs and small streams. The river receives several tributaries, some of which are lake outlets. Little accurate information can be obtained of these waters. Hunters penetrate the interior after moose, mountain sheep, and bear, but their reports are vague and conflicting. The rise and fall of spring tides at Kussilof is over 30 feet, and tide water extends up the river for a distance of 6 miles, to a point where the first rapids are encountered. At low water the stream runs some distance into the inlet between high mud banks, with a bar at the end, which is bare at spring tides. The cannery is on the right bank, with some buildings on the river and some on the inlet. The river at this place is about 150 yards wide.

The superintendent of the cannery stated that all their fish were taken in the inlet, and that the rivers were not fished at all, as fish were not numerous enough to justify making preparation for them. He said that a number of years ago, before there was any law on the subject, he built a trap in the river proper, which took only 20,000 fish during the entire season.

In 1890 Mr. George W. Hume, of San Francisco, built a cannery at Kussilof on the right bank of the river, about half a mile above its mouth. It was operated in 1890, 1891, and 1892. In the latter year it joined the Alaska Packing Association, in 1893 it entered the Alaska Packers' Association, and in 1894 it was consolidated with the Arctic Fishing Company's plant. It has not been operated since 1892.

In 1882 the Alaska Packing Company, of San Francisco, built a cannery at Kussilof, on the right bank of the river at the mouth, utilizing in its construction the available machinery of a cannery built at Old Sitka by the Cutting Packing Company, of San Francisco, in 1878.* In 1885 this cannery was sold to the Arctic Fishing Company. In 1890 the cannery ship, the *Corea*, was wrecked in Cook Inlet, and the cannery was not operated. In 1892 it joined the Alaska Packing Association and was closed, and in 1893 it entered the Alaska Packers' Association, and has been operated by that organization to the present time.

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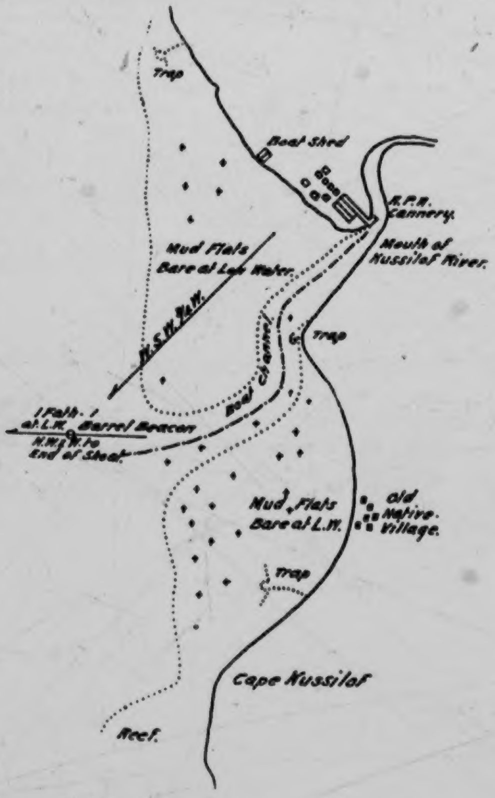
*The Old Sitka cannery made a pack in 1878 and 1879 and was then closed.



Sketch of Kussilof River and Vicinity.

In 1897 the Arctic Fishing Company employed 35 white fishermen, and in the cannery 8 whites, 20 natives, and 100 Chinese. The fishermen used for redfish 15 gill nets, each 50 fathoms long, 6¼-inch mesh, 30 meshes deep, valued at $1 per fathom; also for king salmon, 15 gill nets, each 50 fathoms long, 9½-inch mesh, 22 meshes deep, valued at $1 per fathom; 8 pile and web traps, 30 feet by 50 feet square pots, and leaders 300 to 700 feet long, valued at from $300 to $1,500 each. Three steamers were employed—the *Jennie*, of 70 net tons, with a crew of 6, and valued at $26,000; the *Olga*, of 8 tons, with a crew of 2, and valued at $6,000; the *Arthur*, of 5 tons, with a crew of 2, and valued at $2,100. The chartered bark *Prussia*, of 1,131 net tons, and with a crew of fishermen, was used as a transport. Three sloop lighters worth $400 each, 1 pile-driver worth $750, 1 coal scow valued at $500, 15 gill-net boats at $50 each, and 6 trap scows at $50 each, were also employed.

In 1896 the equipment was practically the same as for 1897, and the same hands were employed.

The Chinese contract of the Arctic Fishing Company was 42½ cents a case. The fishermen received board, $30 a month, and ¾ cent a case. A number of these men remain in the country during the winter, and hunt and trap; some are squaw men. The cannery ship remains at anchor in Tuxedni Harbor, under Chisick Island, on the western shore of the inlet, as the anchorage off the cannery is unsafe.

The following gives the pack of the Arctic Fishing Company at Kussilof River for 1896 and 1897:

Species.	1896.				1897.			
	Number of fish.	Cases packed.	Fish per case.	Dates.	Number of fish.	Cases packed.	Fish per case.	Dates.
Redfish	309,863	23,367	13.2	May 25 to Aug. 14	354,800	24,701	14.1	May 25 to Aug. 12.
Cohoes	27,600	2,300	12	July 20 to Aug. 10	28,000	2,313	12.1	July 20 to Aug. 12.
King salmon	18,076	7,000	2.6	May 25 to June 25	14,083	5,518	2.5	May 26 to July 27.
Humpback	37,800	2,100	18	July 15 to Aug. 10	....	....	....	

This cannery commences to pack when the ice leaves the inlet so that the nets and traps can be used, usually about May 25, and closes about August 14. The first catch consists of king salmon and redfish, the latter in small numbers, but the combined product is sufficient to yield 50 to 100 cases a day. By July 1 the cannery generally has a pack of 8,000 to 9,000 cases, of which two-thirds are king salmon and the rest redfish. During July they expect to pack from 19,000 to 25,000 cases, of which 2,000 cases are king salmon, 2,000 cases cohoes, the remainder redfish; in August, to the 14th, they count on from 2,000 to 4,000 cases, nearly all of which are cohoes.

The height of the run of the different species is as follows: King salmon, from June 10 to 27; redfish, from June 1 to July 25; cohoes, from July 20 until after the cannery closes; and humpbacks from July 15 to August 10.

The cannery conducts all its fisheries, using traps and gill nets. The gill nets are used in the inlet by drifting in the strong tidal currents—on the eastern side from Anchor Point to the East Foreland, and on the western side from Kalgin Island to Tyonek (see Chart B). The current is very strong, so that the boats drift rapidly. The water is not clear.

Five traps are used in the vicinity of Kussilof and three near Kenai. They are built in the usual way, with long leaders from the shore to deflect the fish into the square or heart at the end, which is in deeper water. They are driven in the spring and pulled up when the cannery closes, as no piling would stand the ice which moves in great masses in the inlet during the spring.

The records of 1896 may give a general idea of the relative value of gill nets and traps in Cook Inlet. Of king salmon, 33 per cent were taken in traps and 67 per cent in gill nets; redfish, 87 per cent in traps and 13 per cent with gill nets; cohoes, nearly all in gill nets; humpbacks, nearly all in traps.

OTHER LOCALITIES IN COOK INLET REGION.

Mr. C. D. Ladd operates a saltery a short distance above Tyonek. About 100 barrels for local use would represent the total output in 1897.

On the western shore, below Tyonek, three streams of considerable size are said to empty into Cook Inlet. These streams are no doubt known to the cannerymen, as the gill-net fishermen drift their nets from Kalgin Island to Tyonek. The fish value of the district is fairly well known, except in Kamishak Bay, which is difficult of access and is reported to be foul and dangerous to navigate.

Two large rivers empty into Cook Inlet on the northern shore beyond the North Foreland—the Shushitna and the Knik; the former runs redfish and the latter king salmon. Very little is known of these localities.

THE KARLUK AND CHIGNIK DISTRICT.

EXTENT AND CHARACTER OF THE REGION.

This district extends from Cape Douglas to Unimak Pass and includes the canneries on Kadiak and Afognak islands, Chignik Bay, and Thin Point. From Cape Douglas along the southern shore of the Alaska Peninsula to Chignik Bay the coast is rugged and deeply indented, with high mountain masses impinging close upon the shore. Nearly all of these indentations probably receive streams that have salmon runs, but few of them are known to have redfish in numbers sufficient for commercial purposes. The canneries on Kadiak have prospected over this section and at times have sent a steamer to Kukak Bay and obtained a load of redfish. The canneries in prospecting, or on information from the natives, will locate one or two men on a stream for a full season and provide them with means for salting, judging the value of the stream from their output and their report. The only canneries that have been operated in this locality from Cape Douglas to Chignik have been on the islands of Kadiak and Afognak. The bulk of the packing has centered around the mouth of Karluk River, on the northwest side of Kadiak Island, in latitude 57° 36′ north, longitude 154° 17′ west, where more salmon are taken than at any other one place in Alaska.

The output of this district during the past sixteen years represents 43.8 per cent of the total Alaska pack, Chignik furnishing 8.1 per cent. The percentage has fallen off during the past few years, owing not so much to a reduction in the pack as to the increased output of southeast Alaska and Bering Sea.

During the summer of 1889, in accordance with an act of Congress directing the United States Commissioner of Fish and Fisheries to investigate "the habits, abundance, and distribution of the salmon of Alaska, as well as the present condition and methods of the fisheries," a party composed of Dr. Tarleton H. Bean, Mr. Livingston Stone, Mr. Franklin Booth, and Mr. R. E. Lewis spent the entire season on the islands of Kadiak and Afognak. The report upon their investigations is given in the Fish Commission Bulletin for 1889.

KARLUK.

Commercial fishing for salmon has been carried on at the mouth of the Karluk River for the past thirty years. The first cannery was built in 1882; previous to that a few hundred barrels of salt salmon were annually put up. The earliest account of commercial fishing dates back to 1867, when three parties were engaged in salting salmon. In 1870 the Alaska Fur Trading Company and the Alaska Commercial Company began to salt salmon—at first only to a limited extent, the output gradually increasing from year to year. From this small beginning grew the present great industry.

Prior to 1880 no record was kept of the salmon taken. In that year fishing commenced June 15 and ended September 22. The output amounted to 800 barrels of salt salmon and 100 half-barrels of salted salmon-bellies. The species taken was probably the red salmon (*Oncorhynchus nerka*).

The catch at Karluk in 1895 was approximately 1,762,000 redfish, in 1896 it was 2,650,000, and in 1897 it was 1,867,000. The canneries usually count on packing

GENERAL VIEW OF KARLUK, KADIAK ISLAND, SHOWING SPIT, RIVER, LAGOON, AND VILLAGE

150,000 cases, which would take 1,800,000 redfish, and this is probably a fair estimate of the present capacity of the locality. It is generally believed, even by those interested, that there is a gradual decline, though they still run in large numbers. In 1896 several hauls on Karluk Spit yielded 75,000 salmon to the haul. Hauls of from 25,000 to 30,000 fish are not unusual during the height of the run. It is said that some years ago 100,000 salmon were taken at a single haul on the spit.

The fish are rather small; the general average is probably 5½ pounds in weight. In 1896 and 1897 the average number to the case was 12 fish; in 1897 it commenced at 17 to the case, changing to 15, and at the time of our visit, August 3 to 6, it was 13 to the case. The first run of the season usually consists of very small fish.

KARLUK RIVER.

The mouth of the outlet is in the middle of a curve in the shore line on the northwest side of Kadiak Island, facing Shelikof Strait, forming an open roadstead terminating on the west in a precipitous mountain mass, about 1,600 feet high, called Karluk Head, and on the east in a line of cliffs from 600 to 800 feet high. To the eastward of this so-called river mouth is a narrow shingle spit or bulkhead, making from the cliffs on the east, and closing what was once undoubtedly a narrow bay or estuary, forming it into a lagoon, of which the so-called mouth is but the outlet. On this shingle spit four canneries have been located at different times, but only three are now operated. The spit is three-fourths of a mile long with an average width of about 200 feet, the narrowest part being at the northeast end, where it joins a grassy bluff. The general direction of the spit is northeast and southwest. At the southwest end the outlet empties into Shelikof Strait.

The outlet is 90 feet wide at its mouth, and at times, during a heavy storm from the north or northeast, it shifts considerably, sometimes 50 feet or more. The sea, when it encroaches on the end of Karluk Spit, does little or no damage, but when the opposite bank is heavily washed during the gales of winter the foundation upon which the Alaska Improvement Company's cannery stands is threatened.

The top of the spit is composed of pebbles and coarse gravel; at the water's edge small bowlders appear, and 100 feet or more below low-water mark bowlders of considerable size are strewn over the bottom. When fishing was first commenced off the outside of the spit a large amount of work had to be performed in removing the bowlders before the ground was suitable for making hauls with the drag seine.

Karluk River has its source in two lakes situated about 16½ miles in a direct line from its mouth. The larger lake is about 8 miles long, the smaller 3 miles long. For a distance of several miles the river flows in a west-northwest direction. The mouth of the river proper is 2 miles above the canneries, at a point immediately northeast from the hatchery, where the stream flows rapidly over a bowldery bed and then spreads out into the lagoon (previously referred to) which is slightly affected by the tide.

This lagoon has at the head a width of about 300 yards, and gradually widens until it is nearly half a mile across as it approaches the spit. It suddenly contracts near the end of the spit and the southern shore, and at the outlet, at the point of the spit, it has a minimum width of about 90 feet. The lagoon has a general east-and-west direction, is about 2 miles in length, and, except for the shingle spit which is thrown across its mouth by the action of the sea, its shores are bluff, rising from about 50 to 100 feet. Through the narrows of the outlet the water runs as a rapid at low water, and on the inside the waters are not affected by the tide until the last 3 to 6 feet rise on the high water. Boats can enter the lagoon only after half tide. About half a mile from the mouth of the outlet is a marshy island, which is the end of a large flat making out from the southern bluffs, and which has the greater part bare at low water. The lagoon is shallow, with sandy and grassy bottom and deeper holes along the spit and the northern shore. There is a shallow, regular channel at low water, and with difficulty a flatboat can be worked through. At the upper end of the lagoon the water is slightly brackish and the current flows out; the tide affects it by backing up about 18 inches.

The lagoon generally freezes over in the latter part of November, and as a rule does not break up until late in the spring. In the river, above the lagoon, and at the head of the latter, small bowlders, probably brought down by the ice, are scattered along the banks. It is said that the lakes at the head of the river frequently freeze over, and in an extremely severe winter it is claimed that they freeze to the bottom. The theory is advanced that when the lakes are frozen to the bottom it accounts for the small run of salmon at almost regular intervals.

FISHING-GROUNDS OF THE KARLUK REGION.

The waters surrounding the outlet to Karluk Lagoon are probably the most remarkable in salmon production in Alaska, not only in point of numbers, but in the length of the runs. The fish are principally redfish (*Oncorhynchus nerka*), but stragglers of all the other species are taken, and in some years the humpbacks come in immense numbers. One instance is recorded in which they were so thick in the outlet that a boat could not be pulled through them, and this condition prevailed for weeks. (See Dr. Bean's report.)

When salmon were taken for salting purposes only, and for some time after canneries were introduced, the fishing-ground for Karluk was in the outlet and lagoon, from ¼ mile to 2 miles from its mouth. It was not necessary to go outside, for an abundance of salmon could always be taken near the saltery and cannery. So numerous were they that by a few hauls, with a seine only 40 fathoms long, enough fish could be caught to supply the cannery for a day. On starting out in the morning fishermen were instructed to catch no more salmon than could be handled during the day. Seldom did they fail to bring in the required amount; the chief obstacle in the way was to devise means to take care of the salmon as fast as caught. This was no easy task, for fish were plentiful, the cannery small, and everything connected with it crude, having few of the appliances now in common use. The workmen, as compared with those of to-day, were unskilled and did not move with the speed and expertness now displayed. In a few years, however, it was found that larger nets and a greater number of them had to be used in order to compete with new canneries.

Up to 1889 fishing had been confined to the river, but even this wonderfully prolific stream could not long supply the demands of three canneries, and soon a perceptible falling-off in the daily catch was noticed. Before the season ended all the canneries were taking a large portion of their fish outside the mouth of the river. River fishing was not wholly abandoned, but the major portion of the catch came from the outside fishing-grounds.

The canneries at Karluk are chiefly, but not entirely, supplied from the fisheries in Karluk Bight. A few fish are taken in the vicinity of Red River and Ayakulik, on the western side of the island, a few miles south of Seal Rocks; also off the Slide, the bluff next east of the spit; from the Waterfalls, about 3 miles to the eastward of

Karluk, where two streams fall in cascades over a bluff; and from Northeast Harbor, a small indentation a few miles eastward of the Waterfalls; but these fish all belong to the Karluk school. Some years ago a few were taken at Little River, which is inside and a little westward of Cape Ugat, and from Kaguyak and Kukak, on the mainland. But all these places supply but a very small percentage of the Karluk pack. Occasionally, when there is a slack in the run at Karluk, one or the other of these places may be visited by the cannery steamer. Before the cannery at Uganuk was built the stream at this place was also fished by the Karluk canneries.

TIME OF THE SALMON RUNS.

The time of run is no less remarkable than the numbers of fish. The canneries count for a certainty on obtaining fish from the middle of June to the middle of September. Some years the packing has commenced the latter part of May, and again it has continued into October. Some cannerymen state that the Karluk packing season is from June 1 to September 30. It is true that the records show long runs of redfish in Cook Inlet, Copper River, and Chilkat, but the early runs in these localities are straggling fish, and were it not for the king salmon no attempt would be made to take the redfish at the earliest dates. It appears that the redfish run earlier to the westward than in southeast Alaska. At Attu it is said they run May 1. While the run probably commences to the westward, yet the great difference in time shown by the records is not, in my opinion, altogether real. There are undoubtedly straggling redfish very early in all localities in Alaska, and in a place like Karluk, with a catch of nearly 2,000,000 fish, these early stragglers must come in sufficient numbers to warrant commencing cannery operations, while at a stream having a production of 30,000 to 40,000 fish they may be represented by only a few individuals. Proximity to the sea is, no doubt, also favorable to early runs. The late runs may be accounted for by similar reasoning. It is said that the fish in the late runs are in excellent condition.

It is a question whether the fish that school around Karluk all belong to the Karluk River; that is, whether they would all go up that river to spawn. For some unknown reason large schools of fish come in from the sea and, finding conditions favorable, school around the vicinity of Karluk, and from there distribute themselves in schools along the islands, the rivers on the southern side of the peninsula, and go as far as Cook Inlet.

ILLEGAL FISHING.

Sharp competition has caused most of the streams in Alaska to be excessively fished; it is also more or less responsible for the great amount of illegal fishing carried on in the past and at present. When, however, it is considered that the canneries in Alaska have been striving each season to increase the packs over those of the year preceding, and have resorted to every means to obtain the highest pack, it will be seen that even a person willing and anxious to comply with the law and to fish in a manner not injurious to a stream would soon be forced to abandon his ground. It is only fair to state that most cannerymen are willing to comply with the law regulating the fisheries. But where a few individuals evade the law in every possible manner, using methods which will eventually injure the fishery, and persist from year to year with impunity, there is little or no incentive for others to observe the law.

It is claimed that for a number of years fishing in the river has been limited. Competition has not yet wholly ceased, and frequent seine hauls are made in the river and many salmon taken which would have reached the spawning-grounds in the lakes had they not been disturbed. After a salmon has once run the gauntlet of seines outside the river it should be permitted to perform its chief object in life. Until the law is strictly enforced and fishing in streams can not be openly done with impunity, those who have shown an inclination to protect the salmon fishery will have little encouragement. It is true that the number of salmon taken out of Karluk River is small as compared to the catch on the outside grounds; but even a limited amount of river fishing is sufficient to produce results injurious to the fishery.

Karluk River, like all streams in Alaska where the operation is feasible, has in past years suffered by barricades and zapors. In late years it is said there have been no barricades in the stream. For some time previous to 1889 a fence or barricade had been placed across the mouth of the river near the upper end of the estuary above the seining-ground; but it was removed in that year, and there has since been no obstruction except in 1891, when for a short time a fence was put in to aid in taking salmon for the hatchery which had been built.

CANNERIES OF THE KARLUK DISTRICT.

That a prolific locality like the Karluk should be a bone of contention is only natural, and scarcely a year has passed that some struggle for supremacy between rival canneries has not disturbed the normal conditions. In 1896 the following canneries were open and made packs: Alaska Improvement Company under that company, and the Karluk Packing Company and the Hume-Aleutian under the Alaska Packers' Association. In 1897 the Alaska Packers' Association purchased the cannery of the Alaska Improvement Company and operated all the canneries. The transfer of property took place after the fishing arrangement had been made. By this purchase the association came into possession of all the canneries in the vicinity of Karluk, and purchased what they hoped was peace. But the spring of 1897 saw two canneries built at Uyak, about 18 miles from Karluk, expecting to make their pack from the Karluk beach. The contention arising from the fisheries of these canneries is now in the courts of San Francisco.

Karluk Packing Company.—In 1882 Messrs. Smith & Hirsch, who had been engaged in salting on Karluk Spit, built the first cannery on Kadiak Island. After operating it until 1884 it was organized under the title of the Karluk Packing Company, and has packed under that name every year to date. It joined the pool of the Alaska Packing Association in 1892, and became a member of the Alaska Packers' Association in 1893. It has a capacity of 2,600 cases per day. It has packed more fish than any other cannery in Alaska. Since 1882 the total is 844,642 cases, with an average of 52,790 cases per year. In 1888 it packed 101,304 cases. This cannery employed but few men at first—10 Chinese to perform the mechanical work, and two gangs of fishermen, 5 or 6 men in each, mostly natives. Two drag seines, each 40 fathoms long and 3 fathoms deep, were employed in capturing fish.

Kodiak Packing Company.—The cannery of this company was built in 1888 on the eastern end of the spit, and was operated in 1888, 1889, 1890, 1891, and 1893. It was a member of the pool of the Alaska Packing Association in 1892 and closed that year. In 1893 it joined the Alaska Packers' Association and was operated, but has been closed ever since that date and is held as a reserve. In 1891, under the agreement of the Karluk River Fisheries, this cannery packed the quota of fish allowed the Arctic Packing Company at Uyak Bay. It has a capacity of 1,800 cases a day.

PLATE 54.

OUTER SHORE, KARLUK SPIT, KADIAK ISLAND—VIEW FROM EAST HILL.

Hume Packing Company.—The cannery of this company was built in 1889 on the spit about 400 yards westward of Kodiak cannery, and has been operated every year to date. In 1892 it joined the pool formed by the Alaska Packing Association, and in 1893 it became a member of the Alaska Packers' Association. In 1891, under the agreement of the Karluk River Fisheries, the quota of fish allotted to the Aleutian Islands Fishing and Mining Company's cannery was packed in the Hume cannery, and after that date these two canneries were consolidated under the Hume, which is now known as the Hume-Aleutian. The capacity is 2,600 cases per day.

Aleutian Islands Fishing and Mining Company.—This company in 1888 built a cannery on Karluk Spit in a position which is now about 100 yards westward of the Hume cannery, and operated it in 1888, 1889, and 1890. In 1891 the quota of fish allowed under the Karluk River Fisheries agreement was packed in the Hume cannery, under an agreement known as the Hume-Aleutian compact. After 1891, however, the two canneries were consolidated and, as mentioned above are now known as the Hume-Aleutian. The building is used as a warehouse.

Alaska Improvement Company.—This company was incorporated under the laws of the State of California, and in 1888 built a cannery on the left bank of the outlet, opposite the point of the spit and facing the Shelikof Straits. It was ready to pack in 1888, but was not operated on account of the loss of the cannery ship, the *Julia Ford.* It made a first pack in 1889, and has continued each year to date. In 1891, under the Karluk River Fisheries agreement, the quota of the fish of the Russian-American cannery at Afognak was packed at the Alaska Improvement Company's cannery. It did not enter the pool of the Alaska Packing Association of 1892, nor the Alaska Packers' Association of 1893, but in the spring of 1897 it was sold to the latter organization, and is now operated by that company. It has a capacity of 1,600 cases a day. The cost of the cannery from the time of building until 1896, including all buildings, wharves, machinery, and improvements and additions, was $38,000.

Hume Canning and Trading Company.—In 1893 this company built a cannery on the beach under Karluk Head, about three-fourths of a mile northward of the Alaska Improvement Company, in what is known locally as Tanglefoot Bay. It was operated in 1893 and 1894, and in 1895 it was sold to the Alaska Packers' Association and operated by that organization; it was closed in 1896 and 1897. It is held as a reserve, and has a capacity of 1,600 cases a day.

OUTPUT AND EQUIPMENT OF THE KARLUK CANNERIES.

In 1896 the Alaska Improvement Company packed 87,613 cases of redfish, 12 to the case. No other fish were packed and none salted or smoked. Of the above, 15,580 cases were fish taken at Uganuk, which ran 10 to the case; 3,500 cases from Ayagulik; 340 cases from Kaguayak, and 10 cases from Little River. The balance, 68,183 cases, were from Karluk beach and lagoon. The Aleuts fished the lagoon and the white crews fished the beach fronting the property of the Alaska Improvement Company. Packing begun June 10, when 270 cases were packed—18 cases of Karluk fish and 252 cases from Uganuk. The last fish were packed September 15, all from Karluk. The nets were dragged as late as September 20.

During part of July and August the run of redfish was so large at Karluk that the company sold 101,000 to Hume Bros. & Hume and 54,000 to the Pacific Steam Whaling Company, both at Chignik, and only stopped selling fish to that point by agreement with the Alaska Packers' Association canneries, which were also shipping fish to their cannery at Chignik, and upon request of the salmon inspector, who happened to be there and who saw the great loss of fish in transit and the poor condition in which they arrived at their destination.

In 1896 the Alaska Improvement Company employed 60 white and 18 Aleut fishermen, and 16 white and 122 Chinese cannery-hands, including boss, tester, and cook. The white fishermen were transported free from San Francisco to Karluk and return. From the time of landing until fishing commenced they were paid at the rate of $40 per month, and during this time were employed in getting boats, nets, gear, etc., ready for the season's work. From the time fishing stopped until their departure from Karluk the same rate was paid; during this time they were employed in clearing up and closing the cannery. The fishermen in 1896, at these rates, were paid 40 days in the spring and 54 days in the fall. While fishing they were paid $15 per 1,000 salmon, collectively, and a ration of 35 cents per day per man. Quarters, fuel, water, and salt were supplied and a cook and baker furnished, who together got $100 per month. The fishermen had no work on the vessel either way except to man the pumps. Full crews were kept on the vessels all the time.

The Chinese were transported each way free of charge, but they fed and bedded themselves. They contracted at 45 cents a case, and were found quarters, water, fuel, and salt. A cook was furnished who received $300 for the season. The boss Chinaman had an additional salary of $50 per month besides his lay, and the tester was hired independently and paid $350 for the season.

There were used 3 seines 500 fathoms long, 3¼-inch mesh stretched, 160 meshes deep at bunt, 100 meshes at the offshore end, and 60 meshes deep at the inshore end; 1 seine 350 fathoms long, 3¼-inch mesh; 1 river seine, 175 fathoms long; and 1 seine 150 fathoms long; value of all seines, $1.75 per fathom.

The large seines were used by the white crews on the outside beaches, and the small ones by the Aleuts in the river and lagoon. There were also 2 seines, 500 fathoms long, stretched and hung in the loft ready for use, and some spare web on hand, all valued at $2,000.

The Alaska Improvement Company used an experimental trap at Uganuk in 1896. As there is no timber in this country for piling and as the water is very deep, the trap was made floating. It had a leader of 200 fathoms with a pot 36 feet by 200 feet. Old seines, 3¼-inch mesh, were used in the leader. The following gear was used in anchoring and floating the trap: Six coils 2-inch, 24 coils 2½-inch, and 4 coils 3-inch rope; 400 keg floats and 10,000 cork floats; 12 400-pound anchors, 14 300-pound anchors, and 20 150-pound anchors. Depth of water at pot, 11 fathoms.

The Alaska Improvement Company placed a second floating trap at Uganuk in the spring of 1897, which was similar to the one just described, but larger. It had a leader of 300 fathoms, and a pot 50 by 300 feet, with a circular extension wing 100 fathoms long. Depth at pot at high water, 12 fathoms. There were used in the construction of this trap, aside from the web, 10 coils each of 1½ inch, 2-inch, 2½-inch, and 3-inch rope, 20 coils 2¾-inch rope, 10,000 cork floats, 900 three-gallon keg-floats, and many anchors. These traps were set at the time of the transfer of the property and turned over to the Alaska Packers' Association; but, as the fishery at Uganuk was a failure, they were taken up, and at the time of our visit they were stored in the cannery.

The Alaska Improvement Company employed the steamer *Kadiak*, of 58 tons, with a crew of 8, and valued at $23,000; the steamer *Alaska*, of 23 tons, with a crew of 5, and valued at $7,500; the launch *Delphine*, of 5 tons, with a crew of 2, and valued at $4,500; the launch *Corinne*, of 5 tons, with a crew of 2, and valued at $3,750; the ship *Centennial*, of 1,139 tons, with a crew of 14, and valued at $14,250; the bark *Harvester*, of 716 tons, with a crew of 10, and valued at $7,750; the three-mast schooner *Premier*, of 292 tons, with a crew of 8, and valued at $9,000; also 7 beach seine boats 35 feet long; 2 river seine boats 25 feet long; 1 river seine boat 20 feet long—all valued at $4 per running foot. A large number of dories and skiffs were also used.

In 1896 the Karluk Packing Company and the Hume-Aleutian Packing Company were operated together and under one management, and the equipment will therefore be given under one head. The two companies employed in the fisheries and in the canneries 200 whites, 100 natives, and 200 Chinese. There were used 8 seines 450 fathoms long, 3-inch mesh, 145 meshes deep; 2 seines 425 fathoms long, 180 meshes deep; 1 seine 200 fathoms long, 100 meshes deep, all 3-inch mesh, valued at $1.50 per fathom. The vessels and boats employed were the steamer *Hattie Gage*, of 42 tons, with a crew of 8, and valued at $17,000; 2 launches of about 5 tons each, with crews of 2, and valued at $2,000 each; 13 lighters, valued at $400 each; 70 dories, valued at $25 each; 15 seine boats, valued at $125 each. The transports were the ship *St. Nicholas*, of 1,688 tons, chartered, with a crew of 19; the ship *Santa Clara*, of 1,473 tons, with a crew of 18, and valued at $30,000.

The Karluk cannery in 1896 packed 68,495 cases of redfish, averaging 12 per case, and the Hume-Aleutian 70,320 cases of redfish, of same average size. Both canneries packed from June 5 to September 18. No other fish were packed at these canneries.

In 1897 there were packed in the Karluk district 1,865,731 redfish, making 156,286 cases; also 1,500 cohoes, making 89 cases, or a total of 156,375 cases. Of this number, 2,113 cases were packed at Uganuk. The Alaska Improvement Company packed 49,852 cases of redfish from June 12 to September 21. The Karluk Packing Company packed 54,777 cases of redfish from June 3 to October 9. The Hume-Aleutian packed 49,633 cases of redfish from June 16 to September 20. The average number of fish per case was 11.94.

In 1897 the Karluk Packing Company, the Hume-Aleutian Packing Company, and the Alaska Improvement Company, operating together, employed 16 hatcherymen, 126 white fishermen, 49 whites around the canneries, 390 Chinese, and 25 natives, the latter as fishermen and around the canneries. Of this number, there were taken for the Uganuk cannery 20 white fishermen, 12 white cannery-hands, and 96 Chinese. As the fisheries at Uganuk were a failure in 1897, these hands were all transferred back to Karluk early in July, so that the number first stated may properly be credited to the three canneries operated in 1897 at Karluk.

For the Karluk fisheries there were used 3 drag seines each 500 fathoms long, 125 meshes deep; 8 drag seines each 450 fathoms long, 145 meshes deep; 3 drag seines each 425 fathoms long, 180 meshes deep; 3 drag seines each 200 fathoms long, 100 meshes deep—all 3-inch mesh, and valued at $1.75 per fathom.

The steamer *Kadiak*, of 58 tons, with a crew of 8, and valued at $20,250, was regularly employed, and the steamer *Hattie Gage* was under charter part of the time and used as a reserve part of the time. Four launches were also used, the *Aurora*, *Ida*, *Delphine*, and *Julia M.*, valued, respectively, at $3,700, $2,700, $2,500, and $2,000, all of about 5 tons and carrying 2 men each. The transports were the ship *Santa Clara*, of 1,473 tons, with a crew of 18, and valued at $30,000; the chartered ship *St. Nicholas*, of 1,688 tons, with a crew of 19; the bark *Nicholas Thayer*, of 556 tons, with a crew of 11, and valued at $10,000; the bark *Merom*, of 1,159 tons, with a crew of 15, and valued at $16,000.

The *Santa Clara* made two trips to Karluk; the *Nicholas Thayer*, besides the Karluk trip, made two trips to Loring, and the bark *Merom* made one trip to Naknek. The canneries used 13 lighters, valued at $400 each; 21 seine boats, valued at $125 each; and 113 dories, valued at $25 each. There is a large amount of spare equipment on hand.

The Chinese contract was 40 cents a case, and, as is always the arrangement, on a guaranteed pack. The fishermen have wages until fishing begins, and then an allowance per case. This nets them about $45 per month and board.

REGULATION OF WORK IN CANNERIES.

The canneries at Karluk and the one at Uganuk are under the management of one general superintendent. Each cannery has its foreman and regular number of employees, and in many ways they are separate and work independently of each other. The fish caught are equally divided among the canneries, the pack of each from day to day being so regulated as to amount to about the same. Each cannery packs salmon under the original brands used previous to coming into the association. It has been found necessary to do this in order to hold the established trade. Had new brands been substituted, considerable confusion and dissatisfaction would have arisen, followed by a decrease in the demand for Karluk salmon, for after establishing a reputation a brand of salmon can not be changed without a loss to the cannery.

FISHERMEN IN THE KARLUK REGION.

Each fishing gang has a boss, who directs the setting of the seine and the handling of the boats. Seines are set in their regular turn; as soon as one haul has been made another is commenced. This is kept up day and night when fish are plentiful and the weather and tide favorable. On shore two men, who are known as shore-boss fishermen, keep a sharp lookout for any signs of salmon which may appear off the spit. If, in their judgment, the conditions are favorable for setting seines, the fishermen are called out and repeated hauls made. It frequently happens that fish will be jumping and no particular notice taken of them; at other times one or two salmon observed will be sufficient for the seine to be set. Long experience has taught these men when to make hauls to obtain the best results. They are governed largely by the weather, direction of the wind, and the way fish are playing.

SIZE AND NUMBER OF SEINES.

It has been frequently found necessary to increase the number and length of the seines at Karluk. Commencing with nets 40 fathoms long, they have now reached a length of 500 fathoms. The average length, however, is 450 fathoms. The size of mesh is 3 inches, stretch measure.

A large amount of web and other material for making seines is kept in stock. In the spring the necessary seines are manufactured; when one is worn out, it is replaced by another. The wear which seines receive in this fishery is considerable, and the number expended each year amounts to several thousand fathoms. The quantity of web, corks, and rope kept on hand for making seines varies but little from year to year. In 1895 an inventory of the amount on hand was taken, and, as there has been no material change since, the quantity for that year will answer for 1897. At the

7

SEINING AT KARLUK

A. P. A. CANNERY AT CHIGNIK BAY.

beginning of the season mentioned 11,520 fathoms of web were on hand, equal to about 26,000 pounds, representing in value nearly $4,000, at 15 cents a pound. A seine such as is used here, finished and ready to put in the water, costs 35 cents a pound, which is approximately equivalent to $1 a fathom. This includes corks, leads, head and foot lines. The total length of seines used in 1897 was 6,975 fathoms, representing a value of $6,975. It is difficult to ascertain the number of fathoms of web worn out during a season's fishing, but it is safe to say that the amount reaches nearly two-thirds as much as the combined length of seines hung at the beginning of a season. The small seines, 200 fathoms long, are used in the river; those 425 fathoms and 180 meshes deep are used mostly off the beach in Tanglefoot Bay. The water here is somewhat deeper than off the spit, and requires seines of different dimensions.

IMPROVEMENT IN THE METHOD OF SEINING.

Previous to 1896 seining at Karluk was performed by hand. In that year steam power was introduced, which greatly facilitated the work and reduced the manual labor fully one-half. Formerly the time occupied in setting and hauling a seine was from four to six hours, depending largely on the weather and other circumstances. The average time required to make a haul under favorable conditions was about four hours. In setting a seine the inner end was anchored close to the beach; the outer end, when thrown out of the boat, was usually the length of the seine rope from the shore, about 75 to 100 fathoms. The seine rope was then run to the shore and taken to a wooden capstan. Setting the seine was comparatively easy, but it required the united strength of the crew to haul it in, and frequently the assistance of a second crew was needed. In this way only a few hauls could be made each day. The labor connected with this kind of fishing was hard, and only men inured to exposure could continue through a season.

The easiest part of the work was in surrounding the fish. The crew consisted of 18 men, 8 to row the boat, 2 to tend the seine as it ran out over the stern, 6 on the beach, and 2 stationed in dories to keep the foot line and cork rope clear. Drag seines are not thrown from the boat in the same manner as purse seines; the latter are stowed in evenly piled layers, the corks aft and the twine forward, and set from the side of the boat. Drag seines are stowed with considerably less care, as they run out with little assistance while the boat is being rowed.

STEAM POWER IN THE KARLUK FISHERIES.

The introduction of steam power on shore and the use of steam launches in setting seines has done away with a large portion of the manual labor connected with the fishery. Stowing seines and handling the catch require the same labor as heretofore. In setting a seine assisted by a steam launch, the inner end of the seine is anchored or otherwise fastened near the beach, as was the former custom when all work was performed by hand. The seine boat starts from the shore, from 6 to 8 men at the oars, and 2 men stationed at the stern who keep the seine from fouling as it runs out. When about 75 or 100 fathoms of net have been let out, a steam launch takes the seine-boat in tow. The men take in their oars and give all their attention to the seine, which is rapidly running out. When the seine is set it forms a semi-circle, the outer end being from 600 to 800 feet off shore. The launch then commences to tow this end of the seine to the beach, making a wide sweep, so as to cover as much ground as possible. This frequently occupies an hour or more. When the end of the seine is within about 200 feet of the shore the launch casts off the seine rope, which is picked up by the boat and taken to the shore and placed in snatch blocks which lead to a steam winch and are arranged along the beach. As the seine is hove in, the circle becomes smaller, and in order to have the rope at all times pull from the right direction the seine rope is shifted as the seine comes in, from the outer to the inner blocks. By this means the seine is landed on the beach at the desired spot. During this operation a man is stationed at the post from which the seine rope leads, and gives the necessary signals; he also shifts the seine rope from block to block when necessary.

After the end of the seine is landed on the beach, half of the seine has still to be drawn into a small compass in order to accommodate the size of the catch. This is done by hitching the hauling line around the body of the seine, fluting it as it comes home, and shifting the leads as may be required. In this way the entire seine is hauled in; the hauling is all done from one end. As soon as the seine is dragged into as narrow compass as desired, a dory is anchored a short distance outside the seine, the rode line is paid out until the dory reaches the cork rope, which is taken over the stern of the dory and made fast. This is called a "snag tender." A man is stationed on the outside of the corks to be ready to clear the foot line should it come in contact with anything on the bottom. When the wind is blowing on shore and any considerable surf is heaving in on the beach, the dory keeps the seine in position, preventing it from being thrown into a heap. The catch having been gathered into a bag formed by the net, the corks are made fast to the gunwale of two or more dories, as may be required, and the fish pitched into them with single-tined forks called "pews." When a large haul of salmon is taken, dip nets holding 18 to 20 fish or more are used; this is called "bailing out."

By the time one seine is half in, another is being set, and at no time when the weather is suitable and fish plentiful, except from Friday night to Sunday morning, is the fishing-ground free from seines. Frequently three and four are in the water at once.

It has been the custom not to set seines directly across the mouth of the outlet, but the manner of operation often makes it almost impossible for fish to ascend except in the early spring. Those that escape one haul are likely to be captured in the next. It is true that one day in each week no fishing is carried on. and during that time a considerable number of salmon pass in by the mouth of the outlet, but the majority of these are captured before ascending very far. If fishing in the outlet were entirely prohibited, it would aid very materially in keeping up the supply.

SHIPS AND BOATS.

A fishery so large as that carried on at Karluk requires many boats of different types. The expense of keeping these in repair and supplying new ones when needed is considerable. These cannery ships, like all others connected with the salmon fishery of Alaska, on leaving the home port in the spring are loaded with the raw material to be used during the season, which consists largely of box boards, tin, rope, and machinery; also the required amount of provisions. In most cases the superintendents, foremen, and bookkeepers of the canneries take passage in these vessels; the fishermen and Chinese help are also included among the number.

In all parts of Alaska where drag-seine fishing is carried on, the style of boats varies but little, they being about the same shape and build. Those used at Karluk are from 28 to 30 feet long and 9 feet wide, flat on the bottom, and square across the

UNUSED SALMON CANNERY AT TANGLEFOOT BAY, NEAR KARLUK.

stern. The seine is stowed in the bottom of the boat, and when being set is thrown from the stern by two men. In localities where small seines are used a platform is built at the stern of the boats, upon which seines are stowed. Seines 450 fathoms long, such as are used at Karluk, can not be stowed to advantage on a platform, as considerable room is required, and in a short choppy sea, which is frequently encountered off the mouth of the river, the net would be likely to topple over.

The dories range in length from 16 to 22 feet. The large ones are used mostly in carrying salmon from the seining-ground to the canneries. When fish are plentiful and large hauls are made, scows are used. Small dories are used in tending the seines when set, such as clearing the foot line from bowlders or other obstacles on the bottom. The scows or lighters are principally for loading and unloading the ships, although they are frequently used in handling a large catch of salmon. There are several sizes, varying in length from 36 to 40 feet, the largest having a capacity of 800 cases.

SALMON HATCHERY NEAR KARLUK.

In 1891, when under the Karluk River Fisheries an apportionment of the fish was made for the year by mutual agreement, the organization built and operated a hatchery on the lagoon at a point half a mile below the present hatchery; 2,500,000 eggs were taken, but, owing to bad water, crude appliances, and want of experience, only about 500,000 fish were hatched. As the Karluk River Fisheries agreement went out of existence after the pack of 1891 and the canneries concerned could not agree in continuing the operations, the hatchery was abandoned.

The hatchery now operated at Karluk by the Alaska Packers' Association was built in 1896. It is situated on the southern bank of Karluk River about 2 miles from the outlet, and has been successful from the beginning. The first season, fall of 1896 to spring of 1897, 2,500,000 red salmon were hatched and liberated. In a recent letter from the superintendent of the hatchery, he states that he took over 5,500,000 eggs during the season of 1898, and that they were in an exceedingly healthy condition, the prospects being good for a large output with no undue losses.

Alaska, like most regions where hatcheries have been operated, presents a variety of conditions, both favorable and otherwise, under which artificial propagation must be carried on. A plan which has been followed with success in one locality may fail in another. It is extremely doubtful if there can be found in the Territory two places where propagation can be conducted in detail on precisely similar lines.

The building at Karluk is fitted with all the modern improvements usually found in a hatchery, such as steam engine, pump, and heating apparatus for warming the building and the water in the troughs and spawning pools. Approximately, the size of the hatchery building is 40 by 110 feet, and 1½ stories high. Half the upper floor is a general storeroom; the other part is divided into quarters for the employees; the kitchen and dining room are below.

At the time of our visit work was being actively carried on in the construction of spawning and rearing ponds, and buildings to cover them. One large pond had been previously built in the hatchery in which many of the small fry first hatched had been reared until liberated. It is also used to keep spawn fish in during cold weather. Another pond, situated near the bank of the river, had been used the first season for the same purpose. As the fish grow they are removed from the pond in the hatchery to the one outside.

The water supply is received from two creeks, one at the hatchery, the other three-fourths of a mile away. The water is admitted into the building through the roof, passes through several screens, and is distributed to the troughs under pressure from a tank. The supply reaches the troughs through a 6-inch pipe.

There are 13 sections of 4 troughs each, the total capacity of which is approximately 10,000,000 eggs. Taken as a whole the hatchery compares favorably with the best. Money has not been spared to make it first-class in every respect.

The water in the pond connected with the hatchery can be kept at any temperature desired. In this way a large number of fish can be held for a long period. The average temperature of water during the winter of 1896-97 was 32.5°. In the hatchery it was kept at from 38° to 43°. On a few occasions a temperature of 52° was reached. Many of the eggs were 155 days in hatching.

Few salmon were taken at the hatchery for spawning purposes from the 20th of July to the 5th of August. An abundance of fish entered the lower river, but as river fishing was being carried on, only an occasional salmon was observed as far upstream as the hatchery. Consequently the fishing gang, which was stationed on a projecting point making out from the southern bank of the river, watched for days for favorable signs, making repeated hauls with little or no success. The highest number of fish taken in one day was 83. This catch was made on the 5th of August, the day of our departure. The cause for this remarkable scarcity of salmon at the hatchery was attributable to the frequent seine hauls made inside the mouth of the river near the canneries, from 8,000 to 10,000 being taken there daily. Fish which escaped the seines off the spit were almost certain of capture before they could get very far up the river, thereby minimizing the chances of many being secured at the hatchery. The work of artificial propagation was thus greatly retarded, much to the discouragement of all concerned.

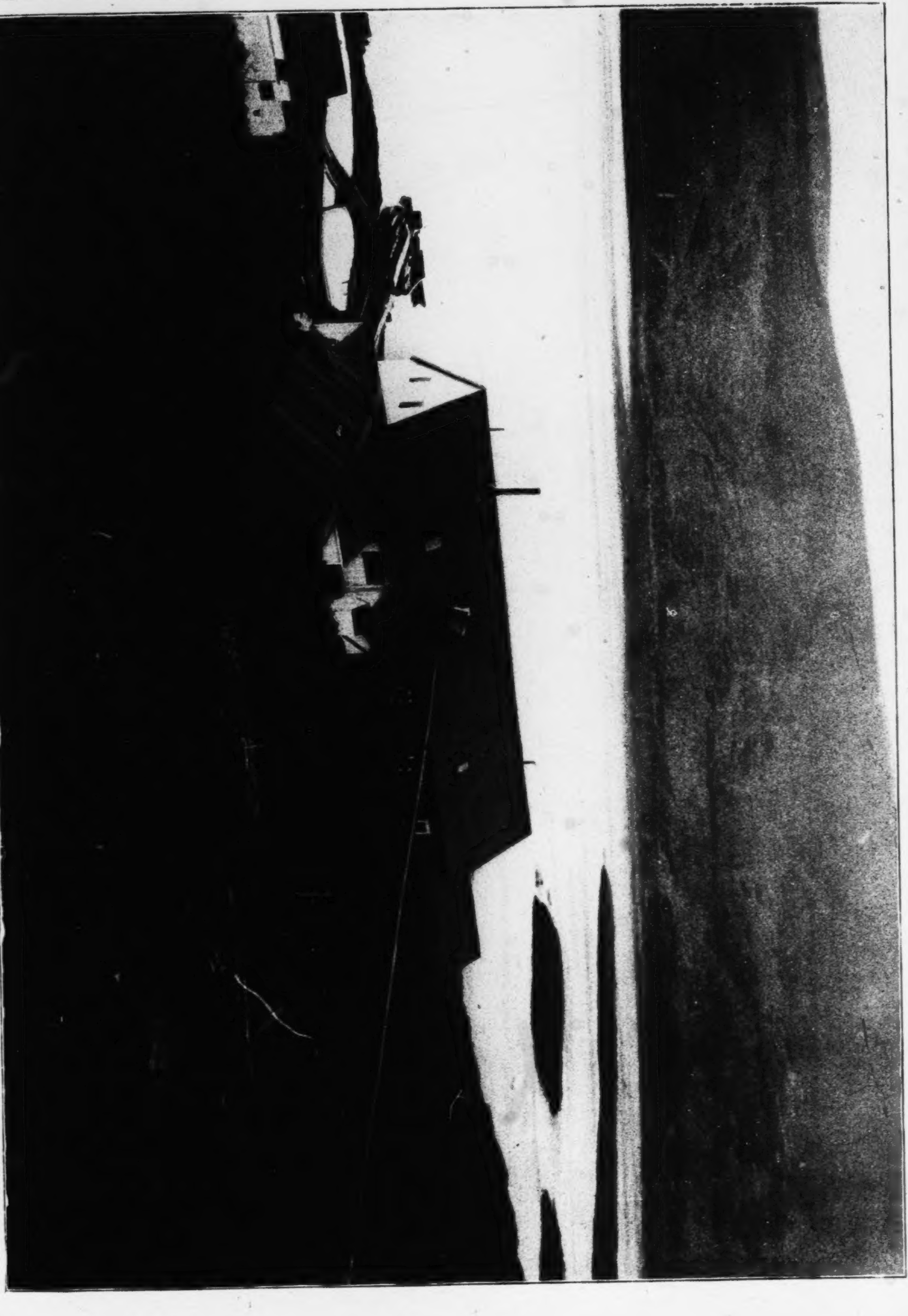
At the end of a fortnight it was deemed advisable to commence supplying the hatchery with spawn fish from the mouth of the river, as at that time the indications were that few salmon would be taken on the hatchery seining-ground. The first day 7,000 fish were caught and placed in the ponds. The mortality was considerable at first, but after a time better results were obtained. It was subsequently learned that during the latter part of August a number of good hauls of salmon were made off the hatchery. Most of the fish, however, were taken outside the mouth of the river.

As long as fishing is conducted in the river the hatchery will at most times labor under great disadvantage, for the seining-ground upstream can not then be depended upon to supply the number of spawn-fish required. Means should be taken to stop all commercial fishing, both in and directly off the mouth of the river. With all obstructions removed, there would during the fishing season be little, if any, difficulty in obtaining spawn fish to run the hatchery at its fullest capacity, and at the same time this would not materially affect the pack of the canneries.

The spawn-salmon are transported to the hatchery by "cars." These are manufactured from discarded dories, and are said to be more serviceable and more easily handled than the ordinary square box car. The fish are placed in the cars as carefully as circumstances will permit. If the tide be low at the time the catch is made, the cars are tied up to the bank of the stream until the tide rises, for the river is too shallow to admit of their being towed to the hatchery, except after half flood-tide.

The transportation of stock salmon in the manner described was in its experimental stage, and the fish did not always arrive at the spawning ponds in good

PLATE 57.



condition. At this time the cars had no covering and the fish struggled wildly in their efforts to escape. This no doubt added largely to their death rate. It has since been learned that later in the season little difficulty was experienced in transferring and holding the fish. Another year, with the increased facilities contemplated, together with the experience gained concerning local conditions during the past two seasons' work, will bring this hatchery up to a high standard.

OFFAL IN KARLUK RIVER.

During a heavy run of fish a large amount of offal is daily thrown into the outlet. Three of the canneries are situated on the bank of the stream and one at the mouth. The refuse material coming from the one at the mouth is usually carried directly out to sea, but that which falls from the other three is for a long time swept back and forth, up and down the estuary, by the current of the stream and tide from the ocean. A considerable amount of this material is sometimes thickly strewn over the bottom, frequently in the path of salmon on their way upstream. At the time of the writer's visit to the river the daily catch of salmon was small, and a correspondingly slight amount of refuse matter was visible; but enough was noticed to form an opinion as to the quantity that would have been dumped into the river had the catch been large.

Inquiries were made of different individuals connected with the fishery as to whether offal in any way affected the progress of salmon in their journey upstream. It was stated that at no time had it been noticed that the movements of salmon had been arrested by offal, either stationary or moving over the bottom. It was claimed that frequently a large number of salmon would be seen in that part of the river where the refuse matter was most abundant, causing the water to be very much discolored, which, so far as could be observed, did not in any way disturb their movements. With most marketable sea fishes, even a small amount of blood or refuse matter has the effect of driving them from the ground, and it would seem that the same rule would apply to the salmon. In order, however, to arrive at a definite conclusion in regard to this matter, a careful study would have to be made of the stream under various conditions. As this river has for years been the dumping ground for such large quantities of refuse, it would seem that its injurious effects are indeed slight.

ALITAK BAY.

Alitak Bay is a deep indentation, with several arms, on the southwestern end of Kadiak Island, about 65 miles from Karluk. A map and a description of the locality are given in Dr. Bean's report, in the Fish Commission Bulletin for 1889, pages 182–184.

The Arctic Packing Company in 1889 built a cannery in the southwest bight of Olga Bay, which is a branch of Alitak Bay, and is connected with it by a long, narrow passage. It has been operated every year since its construction, and in 1892 it was in the pool formed by the Alaska Packing Association, and in 1893 it entered the Alaska Packers' Association. It has a capacity of 1,500 cases. In 1891, under an agreement with the Kodiak Packing Company, in the same locality, the cannery of the latter company was closed and its quota of fish packed in the Arctic cannery. This cannery is the only one now operated in the vicinity of what is locally called the "south end."

In 1897 the company employed 25 white fishermen, 7 white cannery-hands, 10 natives, and 57 Chinese. The apparatus consisted of two drag seines each 250 fathoms long by 120 meshes deep, and two drag seines each 200 fathoms long by 100 meshes deep, one drag seine 100 fathoms long by 80 meshes deep; all mesh 3-inch. The vessels in the service of the company were the steamer *Aleut*, of 19 tons, with a crew of 4, and valued at $10,000; the bark *Kate Davenport*, of 1,175 net tons, chartered and used as a transport; three lighters, valued at $250 each; 4 seine boats at $150 each; 4 scows at $100 each, and 10 dories at $20 each.

The equipment statistics for 1896 are the same as for 1897, except that the bark *Coryphene*, of 771 tons, was chartered for transportation.

The pack for 1896 was made from June 11 to August 28, and consisted of 23,155 cases of redfish, averaging 12 to the case. No other fish were packed. The pack for 1897 was made from June 9 to August 29, and consisted of 513,000 redfish, making 37,401 cases, or an average of 13.7 fish to the case. No other fish were packed, and none salted.

The Kodiak Packing Company in 1889 built a cannery in Snug Harbor, a cove in the passage connecting Olga Bay with Alitak Bay, and operated it in 1889 and 1890. In 1891 its quota of fish was packed in the cannery of the Arctic Packing Company. It entered the pool formed by the Alaska Packing Association in 1892, and in 1893 became a member of the Alaska Packers' Association. The same year the machinery was moved to Karluk, where some was utilized and some held in reserve. It is now dismantled.

UYAK BAY.

Uyak Bay makes into Kadiak Island on the northwestern side, about the middle of its length, and is an extensive sheet of water with ramifying arms, one reaching within a short distance of the southern coast of the island. On the western shore, near the entrance and about 18 miles from Karluk, is Uyak Anchorage. It is an excellent harbor, formed by the main shore of Kadiak Island and Bear and Harvester islands, and is frequently used as an anchorage by cannery ships and the steamers from Karluk during bad weather. Here, on the main shore, are located two canneries.

The cannery of the Pacific Steam Whaling Company is the southernmost of the two, and was built in the spring of 1897, making a pack the same year. It has a capacity of 800 cases a day.

In 1897 the company employed 40 white fishermen, and in the cannery were 20 whites and 60 Chinese. Six drag seines, from 100 to 300 fathoms long, all 3-inch mesh, and valued at about $1.50 per fathom, were used; also one purse seine, 300 fathoms long, valued at $1,000. The vessels employed were the steamer *Golden Gate*, of 50 tons, with a crew of 5, and valued at $20,000; the launch *Beaver*, of 5 tons, with a crew of 2, and valued at $4,000; 2 lighters worth $350 each; 5 seine boats worth $100 each, and 15 dories worth $25 each.

From July 3 to September 15 the company packed 17,000 cases of redfish, averaging 12 to the case. The fish were taken as follows: From Karluk, 90,000; Waterfalls and Slide, 65,000; Little River, 6,000; Uganuk, 1,000, and Alitak, 42,000. The total number of redfish used was about 204,000.

The cannery of Hume Brothers & Hume is the northern one at Uyak Anchorage, and was built in the spring of 1897, making a pack the same year. It has a capacity of 800 cases a day. In 1897 it employed 75 white fishermen, and 32 whites and 60 Chinese around the cannery. They used 3 gill nets, 200 fathoms long, 30 meshes deep, 6-inch mesh, valued at 65 cents per fathom; 6 drag seines, 200 to 300 fathoms long, 100 to 125 meshes deep at bunt, valued at $1.75 per fathom. Their vessels were the steamer *Equator* (changed from schooner of same name), 40 tons, crew of 7, valued at $10,000;

CANNERY AT UYAK BAY.

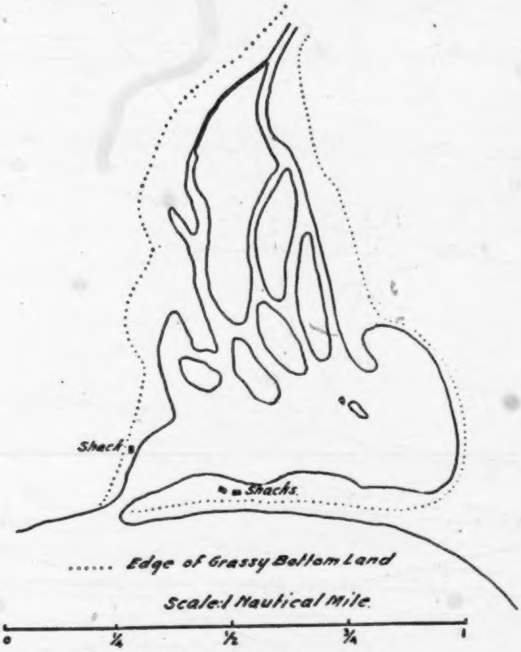
the bark *Harvester*, 716 tons, crew of 12, valued at $7,500; 2 lighters at $350 each; 12 seine boats at $100 each. The number of fishermen and cannery hands seems large for a small cannery, but it is the number given by the company. Some of the hands from their plant at Chignik may have been brought here and credited in error, to both canneries.

From June 14 to September 15 the firm packed 169,824 redfish, making 13,375 cases, an average of 12.7 fish to the case. Of this number 5,000 fish were taken in gill nets, and the rest in seines. They were taken at the Waterfalls and Slide, Uganuk, Little River, Red River, and Ayagulik, all on Kadiak Island.

A few small streams carrying salmon flow into Uyak Bay and its branches, but none is known to carry redfish.

LARSEN BAY.

Five miles southeast from Uyak Anchorage is a narrow arm called Larsen Bay. It is 4 miles long, with a general east-northeast and west-southwest direction. Immediately within the entrance, on the northern shore, is the site of the cannery of the Arctic Packing Company, which was built in 1888, and operated in 1888, 1889, and 1890, but which has been closed since the latter date. In 1891, under the Karluk River Fisheries, its quota of fish was packed in the cannery of the Kodiak Packing Company at Karluk. In 1892 it entered the pool of the Alaska Packing Association, and in 1893 it became a member of the Alaska Packers' Association. In 1896 the available machinery was removed and utilized in the construction of the cannery at Uganuk. All that remains of the cannery is a large building used as a warehouse, the wharf, and a few sheds. A watchman is retained to look after the buildings, as the site has not been abandoned. When the cannery was operated the fish were obtained from Karluk, Little River, Waterfalls, and Slide.



Sketch of Vicinity of Little River.

From the head of Larsen Bay it is not more than 5 or 6 miles to Karluk Lake, which a party of five attempted to reach and failed.

LITTLE RIVER.

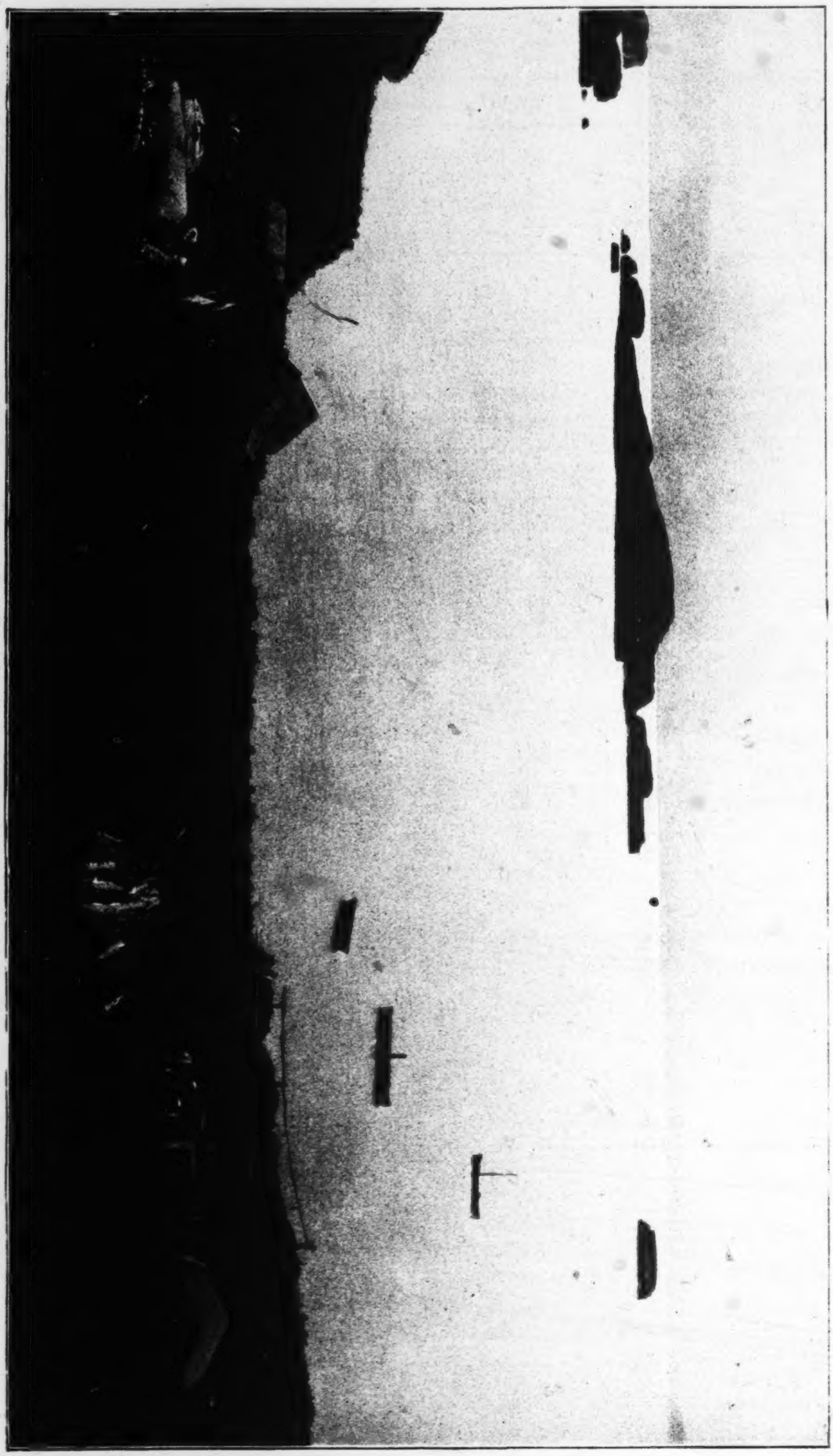
Little River, one of the fishing stations just mentioned, empties into Shelikof Straits about a mile to the westward of Cape Ugat. Hume Bros. & Hume and the Pacific Steam Whaling Company canneries at Uyak fished here in 1897, and have fish-houses located on the beach. The formation of the mouth of the river is similar to that at Karluk, but on a smaller scale. There is a small lagoon formed by a shingle and bowldery spit closing up a valley running south-southeast and north-northwest. The lagoon is three-fourths of a mile wide along the spit, with open water extending three-eighths of a mile from it. The stream flows into the lagoon through several channels, forming a number of grassy islands. Above this the stream flows with little current through bottom land having a few patches of alders, which, a mile from the beach, narrows to one-eighth of a mile. The bottom of the stream is fine sand and gravel, and the shores are grassy but without beaches. The top of the spit is about 8 feet above the lagoon, and at the eastern end is the outlet, 30 feet wide, and running in a rapid to the straits.

UGANUK BAY.

Uganuk Bay is the next to the eastward of Uyak. From the lower end of the western bay three arms make off, which we have called the northeast, east, and south arms, respectively. At the junction of the east arm with the bay, on a sand and shingle beach on the northern shore, the cannery of the Alaska Packers' Association is located, and at the head of the arm is the redfish stream from which it draws its supply of salmon. For several years a saltery was operated by Mr. Oliver Smith in a bight on the southern shore of the east arm, a mile within the entrance. This was sold to the Association in 1897, and is now closed.

Cannery at Uganuk Bay.

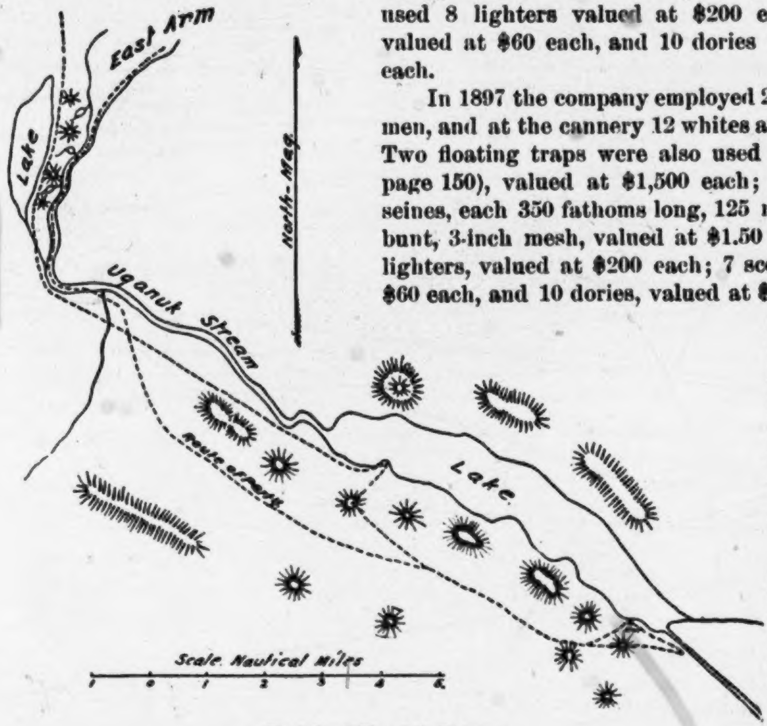
The Uganuk cannery of the Alaska Packers' Association was built during the spring of 1896, on the point forming the northern entrance to the east arm. The material used in its construction was largely from the cannery building of the Russian American Packing Company moved from Afognak, and the machinery is that which was available from the canneries of the Royal Packing Company at Afognak and the Arctic Packing Company at Larsen Bay (Uyak). The capacity of this cannery is



NATIVE VILLAGE ON UGANUK BAY.

1,400 cases a day. It made a pack in 1896, and commenced to pack in 1897, but was closed early in the season on account of a failure in the run of fish, and the employees were transferred to Karluk, where they assisted in making the pack. This cannery is in the Karluk district of the Alaska Packers' Association.

In 1896 it employed 20 white fishermen, 12 white cannery-hands, 16 natives, and 70 Chinese. It had one trap across the mouth of the river, valued at $800; 2 drag seines, each 350 fathoms long, 125 meshes deep, 3-inch mesh, valued at $1.50 per fathom. The station was attended by the Karluk steamer when necessary, and the transportation was done by Karluk vessels. It used 8 lighters valued at $200 each, 7 scows valued at $60 each, and 10 dories valued at $20 each.



Sketch of Uganuk Stream.

In 1897 the company employed 20 white fishermen, and at the cannery 12 whites and 90 Chinese. Two floating traps were also used (described on page 150), valued at $1,500 each; also two drag seines, each 350 fathoms long, 125 meshes deep at bunt, 3-inch mesh, valued at $1.50 per fathom; 8 lighters, valued at $200 each; 7 scows, valued at $60 each, and 10 dories, valued at $20 each. The station was attended by the Karluk steamer, and the transportation was done by vessels from the same place. The company packed 21,005 cases of redfish in 1896, averaging 10 to the case, from June 10 to July 26. In 1897 they packed 2,113 cases of redfish, averaging 10 to the case, from June 10 to July 13. As there was a failure in the run, the cannery was closed and the force moved to Karluk.

At the time of our visit, August 10 to 14, all gear was stored and the cannery was in charge of a watchman, so we saw none of the fishing. From the salmon inspector's report for 1895, from the accounts of different people connected with the fisheries here, and from personal inspection of the ground, the following information with reference to these fisheries was obtained:

In 1896 some of the force from the cannery of the Alaska Improvement Company, at Karluk, and the fishermen of the Uganuk cannery fished these waters. Besides using drag seines, the former company had a floating trap in the east arm, and the latter a net barricade almost entirely across the mouth of the river.

The river at its mouth flows over tidal flats in an east-and-west direction for a distance of 2 miles, having an average width of half a mile. These flats are largely uncovered at low water, having two channels through them, one close to the northern shore and skirting the native summer village; the other, entering near the center of the width of the arms, turns sharply to the northward around the northern end of a large rocky and wooded island, when it turns again to the westward. From the northern end of the island a line of piling was driven across the flats and the mouth of the river to the northern shore of the arm, leaving an opening in the low-water channel, across which a gill net was stretched.

The trap described on page 150 was about a mile west from this barricade, leading from the northern shore, with the pot in deep water in the arm proper. Captain Phillips, of the Revenue-Cutter Service, directed this trap to be removed, upon which the Alaska Improvement Company protested to the Secretary of the Treasury, and the matter was referred to the Department of Justice. The correspondence, decision, etc., will be found on pages 8 to 10, salmon inspector's report for 1896.

In 1897 the Alaska Improvement Company replaced the 1896 trap and placed a second floating trap, leading from a point near the saltery on the southern shore. This must have been quite half a mile long, and at the point where it was set must have extended across the middle of the arm. The two traps undoubtedly commanded the arm. Upon the sale of the property the traps were turned over to the purchasers. Neither took many fish, and it is not unlikely that the larger trap was improperly set; that is, the pot was arranged for fish coming downstream. No traps had been used prior to 1896.

A party of five visited the lake at Uganuk. After a hard walk of five hours, covering a distance of about 12 miles, along sloping mountain sides, over grassy plains, through thickets of cottonwood, alder, and willow, and along bear trails, they reached a point on the lake about a mile within the outlet, but as the view of the lake to the southeast was cut off by intervening ridges, it was determined to reach the head of the lake. After crossing the mountains bordering the southern side of the lake, and obtaining a photograph of the river valley to the east arm, the party followed a valley of gradual ascent which carried them to a height of about 1,200 feet above the lake, whence the head of the lake and two inflowing streams could be seen. The head of the lake was reached after about five hours' walk from the first point.

The lake is somewhat crescent-shaped, about 6 miles long in a northwest and southeast direction, and of an average width of about a mile. It lies throughout its length between two ridge-like mountain masses which reach a height of 2,000 feet above its surface. The banks are steep, precipitous in many places, and heavily wooded to a height of 300 to 400 feet. There are numerous shelving beaches of gravel, black sand, and fine slate. The lake has the appearance of being very deep. At the southeast end are two inflowing streams about a quarter of a mile apart at the mouths; the larger one, flowing from the southeast, is about 40 yards wide, and the smaller one, flowing more from the eastward, is about 15 yards wide. From the top of the mountain the valley of the larger stream could be plainly seen for a distance of nearly 10 miles, the country, as far as could be seen, in this valley being heavily wooded with larger growth than nearer the coast.

The bottoms of both inflowing streams are large, with sandy and gravelly beds. A number of redfish of a red color were seen in the stream in places where the water

SUMMER FISHING VILLAGE ON STREAM AT HEAD OF UGANUK BAY.

flowed gently, and in depths of 2 to 3 feet. In the lake a large number of salmon indicated their presence by jumping. At a point about 500 yards within the mouth of the inflowing stream from the southeast, it is from 30 to 40 yards wide, with an average depth of 1½ feet and a velocity of 2 to 3 feet per second.

At the northwest end is the lake outlet, which flows generally with considerable velocity through a wide river valley. It is well wooded, having along its banks dense thickets of alder and willow interspersed with large cottonwoods. About 4 miles from its mouth a photograph was taken; here it is about 50 yards wide, 1½ feet deep, and flows with a velocity of 3 feet per second. Its general course is to the northwest, and from the lake to the mouth is a distance of about 8 miles. From the mouth the river flows into the east arm through a wide tidal basin at low water by two channels for a distance of 2 miles. About 3 miles above the mouth it receives a small tributary, which is also an outlet to a small lake.

In 1896 the canneries took 365,850 redfish from around the mouth of the stream. In 1897 the fisheries were a complete failure; the stream probably did not yield 15,000 redfish. The Aleuts say this failure was due to the lack of snow. The redfish from Uganuk are highly prized by the canneries, as they are much larger than the Karluk fish, running 10 to the case.

Inaccessibility renders this site unfit for a hatchery.

I may mention here the large number of bears infesting this region. Along the streams their trails cross and recross like the lines on a checkerboard. Half-consumed salmon were seen everywhere, and quite frequently salmon were noticed whose life was not yet extinct, having been abandoned by bears that had been alarmed at our approach.

AFOGNAK ISLAND.

Afognak Island was not visited, because there is no cannery in operation at that place now. While it seemed desirable to see the stream, it has been fully described in Dr. Bean's report, pp. 185-188 and pp. 207-208, Bulletin IX, 1889, United States Fish Commission. I will therefore only refer to it in connection with the brief histories of the canneries.

Afognak is a large island northeast of Kadiak, and separated from it and Raspberry Island by a narrow strait, which is much obstructed. On the southern side, near the western end, is Afognak Bay, which receives the waters of a lake outlet, and was once a very good redfish stream.

Mr. Livingston Stone examined this stream with especial reference to its adaptability for hatchery purposes, and in accordance with an act of Congress, approved March 3, 1891, the President, by proclamation of December 24, 1892, set aside "Afognak Bay, River, and Lake, with their tributary streams and sources thereof, and the lands including the same on said Afognak Island, and within one mile from the shores thereof, as a reserve for the purpose of establishing fish-culture stations, and for the use of the United States Commission of Fish and Fisheries, the boundary lines of which include the head springs of the tributaries above mentioned, and the lands the drainage of which is unto the same."

The stream at Afognak has been much abused by barricades. The Russians built a zapor in the river which has been maintained by their descendants, first for their own use, and afterwards to supply the cannery. Although the place is reserved by the Government, I am told that it is still fished (1897) for cannery purposes. The value of this stream some years ago was from 10,000 to 15,000 cases a year. Its present value is unknown.

The Royal Packing Company built a cannery in 1889 at the head of Afognak Bay, on the western side, three-fourths of a mile below the mouth of the river, and operated it in 1889 and 1890. Under the agreement of the Karluk River Fisheries in 1891, the quota of fish for this cannery was packed in the cannery of the Karluk Packing Company at Karluk. It entered the pool of the Alaska Packing Association in 1892, and became a member of the Alaska Packers' Association in 1893. It has not been operated since 1890, and it is claimed that the President's proclamation of December 24, 1892, reserving the stream at Afognak, has caused the cannery to be closed and dismantled. In the spring of 1896 the available machinery was moved to Uganuk, and in the building are now stored the boats and some gear of this cannery and of the Russian-American.

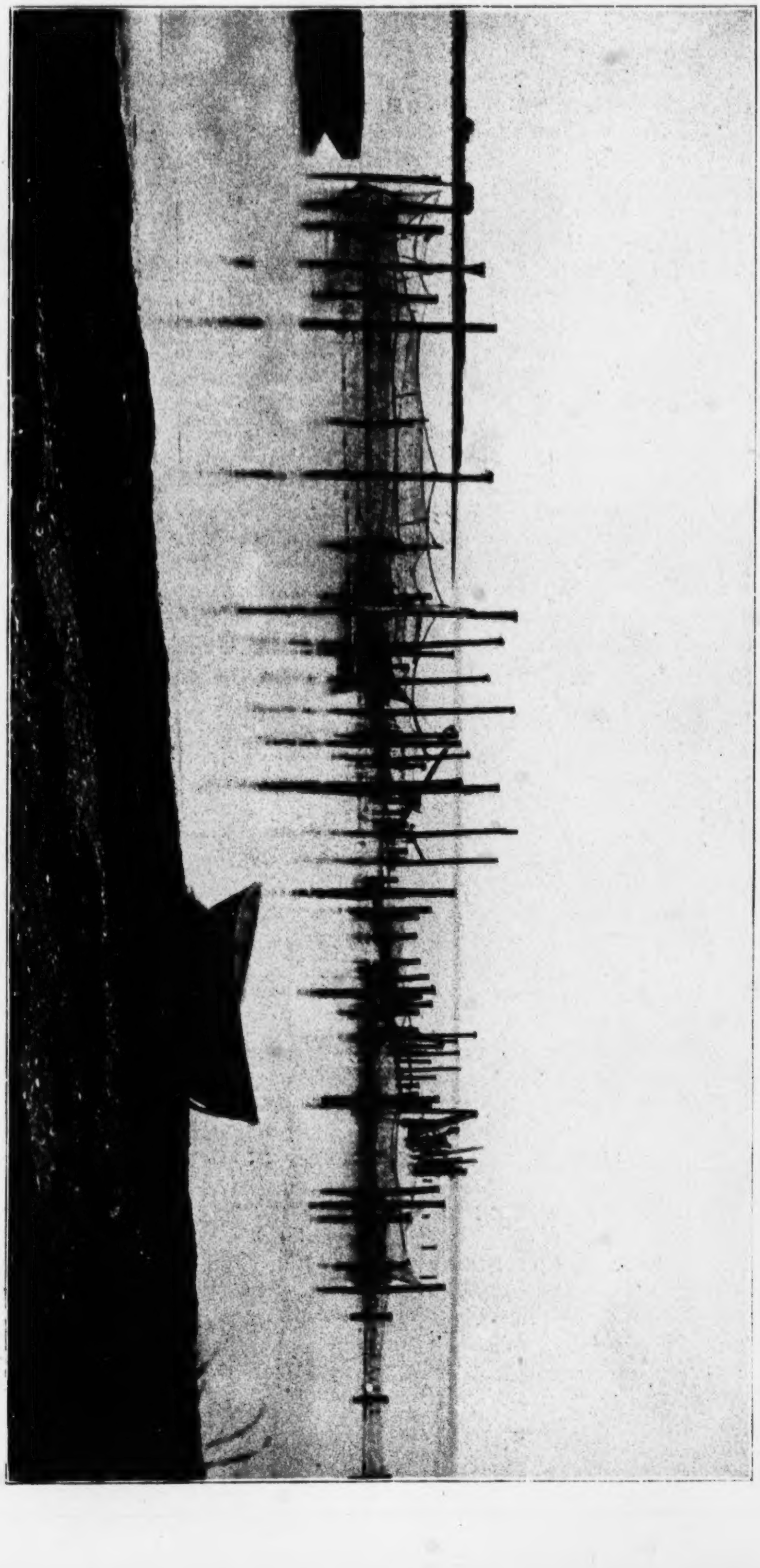
The Russian-American Packing Company was incorporated in December, 1888, and in 1889 built a cannery immediately above that of the Royal, which was operated in 1889 and 1890. In 1891, under the agreement of the Karluk River Fisheries, its quota of fish was packed in the cannery of the Alaska Improvement Company at Karluk. In 1892 it joined the pool of the Alaska Packing Association, and in 1893 it became a member of the Alaska Packers' Association. It has not been operated since 1890, and it is claimed that the President's proclamation of December 24, 1892, reserving the stream at Afognak, has caused the cannery to be closed and dismantled. In 1895 the available machinery was moved to the Ugashik (Sulima) River, in Bering Sea, on the western side of the Alaska Peninsula, and utilized as a part of the machinery in a cannery built at that point by the Alaska Packers' Association, and operated in 1896 and 1897. In the spring of 1896 the building was taken down and moved to Uganuk, and erected there for the cannery built that year by the Alaska Packers' Association. Nothing remains at Afognak of the Russian-American cannery except the boats, which are stored in the building of the Royal Packing Company.

There is a redfish stream on Afognak Island, known as Malinof River, which empties into Malinof Straits near its junction with Shelikof Straits. It has for years been heavily barricaded.

CHIGNIK BAY.

Chignik Bay, on the southern side of the Alaska Peninsula, is 150 miles west-southwest from Karluk, the position of one cannery in Anchorage Bay, an arm of the main bay, being in latitude 56° 17′ north, longitude 158° 23′ west. This is the next western locality after Karluk where canneries are now operated, and the westernmost outside of Bering Sea.

The southeast point of Chignik Bay terminates in a high-turreted or castellated point called Tuliumnit Point or Castle Cape, having on its western side a large arm making to the southward, called Castle Bay. Passing this bay and continuing along the southern shore to the westward, four headlands are seen forming the terminal points of high ridges, and between them are shallow bights and sand beaches. These beaches have the appearance of spits inclosing lagoons or ponds. To the westward of the fourth ridge, and about 12 miles from Tuliumnit Point, a small, deep bay, known as Anchorage Bay, makes in on the southern shore. This is partially protected by a sand-spit, affording good anchorage in deep water for all winds, except from the north. Two canneries are located here, and the transporting vessels of all the Chignik Bay canneries make their anchorage at this point.



POUND NET IN CHIGNIK BAY.

Continuing to the westward, another shallow bay makes in on the southern shore, known as Doris Bay, locally called Mud Bay, which has an indifferent anchorage off its mouth. Around the high, round, bold head next to the westward is the entrance to Chignik Lagoon, in the extreme southwest corner of Chignik Bay. Two canneries are located on this lagoon, and at the head is the mouth of the stream, from which all the canneries here and in Anchorage Bay draw their supplies of redfish.

In 1888 the Fishermen's Packing Company of Astoria, Oreg., sent a party to Chignik Bay to prospect for fish, and they returned in the fall of that year with 2,160 barrels of salt salmon.

The Chignik Bay Company's cannery was built and operated in the spring of 1889 by the Fishermen's Packing Company of Astoria on the eastern shore of Chignik Lagoon, 2½ miles from the entrance. As this cannery is frequently referred to as the "Scandinavian," resulting in some confusion, it may be mentioned that prior to the building of this cannery the Fishermen's Packing Company purchased the property of the Scandinavian Packing Company of Astoria, and also built the cannery of the Alaska Packing Company on the Nushagak.

The Shumagin Packing Company, composed of capitalists from Portland, Oreg., built a cannery on Chignik Lagoon in 1889, near that of the Chignik Bay Company, and operated it that year, and the same year the Chignik Bay Packing Company, of San Francisco, built and operated a cannery near the two just mentioned. Though these three canneries were built by different companies, they soon became closely allied and finally combined into one organization, so that the history of one is practically that of all. The operating agreement of these three canneries was successfully carried out in 1890 and 1891. In 1892 they all joined the pool of the Alaska Packing Association, and the cannery of the Chignik Bay Company alone operated. In 1893 they became members of the Alaska Packers' Association.

Since 1891 only the Chignik Bay Company's cannery has been operated. The Shumagin building has been moved alongside that of the Chignik Bay Company and the machinery consolidated, so as to form practically one large cannery, with a capacity of 2,600 cases per day, which is operated, and erroneously called the Chignik Bay Packing Company. It is really the Chignik Bay Company, for the cannery of the former is in such condition that it can be operated independently on short notice, and is held as a reserve. It has a capacity of 1,500 cases a day.

In 1896 the Chignik Bay Company employed 73 white fishermen and 3 white coal-miners; in the cannery were 13 whites and 158 Chinese; 33 natives were kept at various employments. The company used 3 gill nets, 150 fathoms long, 6¼-inch mesh, valued at 65 cents per fathom; 9 traps, 1,350 feet long, at $1,000 each; 5 drag seines, 200 fathoms long, 3-inch mesh, 100 meshes deep at bunt, at $1.50 per fathom.

The vessels and boats were the steamer *Afognak*, of 38 tons, with a crew of 9, and valued at $15,750; the stern-wheel steamer *Baby Ruth*, of 10 tons, with a crew of 3, and valued at $4,500; 7 lighters, valued at $500 each; 10 trap scows, at $200 each; 2 pile-drivers, at $650 each; 12 seine and gill-net boats, at $125 each. The ship *Llewellyn J. Morse*, of 1,271 net tons, valued at $25,000, with a crew of fishermen, was used as a transport.

In 1897 the employees consisted of 57 white fishermen, 3 coal-miners, 13 white cannery-hands, and 103 Chinese. The fishermen used 3 gill nets, each 150 fathoms long, valued at 65 cents per fathom; 10 traps, averaging 1,350 feet long, valued at $1,000 each; 5 drag seines, each 200 fathoms long, 3-inch mesh, valued at $1.50 per fathom. The vessels and boats were the steamer *Afognak*, of 38 tons, with a crew of 9, and valued at $15,750; the stern-wheel steamer *Baby Ruth*, of 10 tons, with a crew of 3, and valued at $4,500; the ship *Llewellyn J. Morse*, of 1,271 net tons, valued at $25,000, with a crew of fishermen; 8 lighters, valued at $350 each; 10 trap scows, at $200 each; 3 pile-drivers, at $650 each; 12 seine and gill-net boats, at $125 each.

The following shows the pack of the Chignik Bay Company for 1896 and 1897:

Year.	Species.	Number of cases packed.	Average number of fish per case.	Date of packing.
1896	Redfish from Chignik Bay	37,893	10	June 16 to Aug. 25.
	Redfish from Karluk	7,388	12	Do.
	Cohoes	2,204	11	Aug. 18 to Sept. 25.
	Humpbacks and dog salmon	* 876	....	Aug. 5 to Sept. 1.
1897	Redfish	36,834	12.4	June 8 to Aug. 27.
	Cohoes	942	11	Aug. 1 to Aug. 27.
	Humpbacks and dog salmon	383	....	July 31 to Aug. 25.

* There is no record of king salmon, though a few were probably packed and counted in with the cohoes.

Hume Bros. & Hume built a cannery on the eastern side of Anchorage Bay in the spring of 1896, and made a pack that year and in 1897. Its capacity is 800 cases per day. In 1896 they employed 40 white fishermen, 20 white cannery-hands, 90 Chinese, including boss, tester, and cook. Ten gill nets were used, each 200 fathoms long, 6¼-inch mesh, 40 meshes deep, valued at 75 cents per fathom; also 2 traps, 150 and 200 fathom leads, 40 feet square pots, web 3-inch mesh, valued at $1,200 each; 3 drag seines, 100 fathoms, 200 fathoms, and 250 fathoms in length, the larger ones 100 meshes deep at bunt, and all valued at $1.50 per fathom.

The vessels and boats were the steamer *Florence Hume*, of 8 tons, with a crew of 2, and valued at $3,000; the bark *Leon*, with a crew of 12, and valued at $7,000; the schooner *Equator*, of 69 tons, with a crew of 6, and valued at $6,000; 4 trap scows at $100 each; 1 sail scow at $500; 4 lighters at $350; 10 gill-net boats at $200 each; 8 skiffs, etc., at $25 each.

In 1897 the company employed 55 white fishermen, 10 white cannery-hands, and 65 Chinese, including boss, tester, and cook. The same equipment was used as in 1896, except 5 traps instead of 3, and instead of the bark *Leon* the bark *Ferris S. Thompson*, of 514 net tons, with a crew of 11, and valued at $7,500, was used as a transport.

The following shows the packs of Hume Bros. & Hume's cannery at Anchorage Bay for 1896 and 1897:

Year.	Species.	Number of cases packed.	Number of fish per case.	Date of packing.
1896	Redfish from Chignik Bay	9,343	10	June 16 to Aug. 25.
	Redfish from Karluk	8,300	....	Do.
	Cohoes	50	11	Throughout season.
	Humpbacks	200	20	July 20 to Aug. 20.
1897	Redfish	12,000	12	June 12 to Aug. 12.

In 1896 nearly all the Chignik Bay fish were taken in seines, and only 3,500 in traps. A few king salmon were salted for personal use.

In 1897 the fish were all taken at Chignik Lagoon or off the entrance, in the proportion of 4 in the gill nets, 2 in traps, and 1 in seines. No other fish were canned, smoked, or salted, and none were purchased.

The Pacific Steam Whaling Company in the spring of 1896 built a cannery on the eastern shore of Anchorage Bay, one-fourth of a mile south of the Hume cannery, and made a pack that year and in 1897. Its capacity is 800 cases per day. In 1896 it employed 30 white fishermen, 15 white cannery-hands, and 58 Chinese. Its nets included 5 traps, 40 feet square pots, with leads of 150 to 200 fathoms, valued at $1,100 each; 2 drag seines, 250 fathoms long, 3-inch mesh, valued at $1.50 per fathom. The vessels and boats employed were the steamer *Salmo*, of 35 tons, with a crew of 4, and valued at $7,000; the bark *J. D. Peters*, which carried the outfit to the station in April and called in the fall for the pack; 11 lighters and scows, valued at $50 to $150 each; 1 pile-driver, valued at $650; 4 seine boats, valued at $60 each; and a number of dories, skiffs, etc.

In 1897 the company employed 60 white fishermen, 15 white cannery-hands, and 58 Chinese. The remainder of the outfit used is the same as for 1896, except that 8 traps, instead of 5, were in use, and 2 pile-drivers instead of 1.

The following shows the pack of the Anchorage Bay cannery of the Pacific Steam Whaling Company for 1896 and 1897:

Year.	Species.	Number of cases packed.	Number of fish per case.	Date of packing.	Remarks.
1896....	Redfish from Chignik .	14,000	10	June 18 to Aug. 25..	Taken in traps.
	Redfish from Karluk ..	4,500	12	.....do	Do.
	Cohoes	90	11	July 18 to Aug. 15 ..	Do.
	Humpbacks............	2,800	20	July 20 to Aug. 20 ..	Taken in seines.
	King salmon	125	3	Throughout season.	Do.
1897....	Redfish	23,500	12	June 9 to Aug. 15...	About 1,500 redfish from Karluk were not in condition for packing and were not used.
	Humpbacks............	500	20	July 20 to Aug. 15 ..	
	Cohoes and king	....	....	....	A few taken, but not separately accounted for.

The Chinese contract differs slightly according to locality, and more largely according to the manner of making the pack. The contract for one cannery was 40 cents per case for machine-filled cans and 45 cents for hand-filled. The Chinese boss was paid $50 a month in addition to his lay, and the tester $50 a month without lay. Passage to and from San Francisco was free, but they found their own food and bedding, only water and salt being furnished by the vessel. Quarters, fuel, water, and salt were furnished at the cannery. In all of the Alaska canneries the Chinese contract includes a guaranteed pack—that is, the cannery insures a pack of a certain number of cases; if it is not made, the Chinamen are paid the stipulated pack; if the pack overruns, they are paid extra at the same rates.

The contracts with the fishermen differ somewhat at each cannery, but they are usually made with the view of getting the largest number of fish and allowing the fishermen about $45 a month and board for 6 or 7 months. At one cannery in Chignik, in 1896, fishermen were paid $30 per month and one-fourth of a cent per case and board. They worked the vessel to and from the cannery. In 1897 the same cannery paid the Scandinavian fishermen the same rates as in 1896, but the Italians received $20 per month, $12.50 per 1,000 fish, and a per diem allowance of 35 cents per man for a ration. The boss fisherman had an extra $125 for the season. Nearly the same rates are made at all the canneries here.

Nearly all the fish packed in the canneries located on Chignik Bay are taken in Chignik Lagoon and the immediate vicinity. In 1896, on account of the very large run at Karluk, the canneries there could not handle all the fish taken on the spit—that is, they did not have outfit enough—and fish to the amount of about 20,000 cases were sent to the Chignik canneries; but this was exceptional, and was stopped by order of the salmon inspector. Occasionally a cannery steamer will visit the streams between Tuliumnit Point and Kupreanof Point and secure a load of humpbacks.

CHIGNIK LAGOON.

Chignik Lagoon is in the extreme southwest corner of Chignik Bay and is joined to that bay by an outlet one-fourth of a mile wide, contracted at this point by a narrow sand-spit about 1¼ miles long, which makes directly across from the western shore. The main body of the lagoon is 6½ miles long, with a general southwest direction, and at the southwest end has a narrow extension, 1½ miles long, into which the river flows. Within the spit, at the entrance, it is 1¼ miles wide, opening out to 1½ miles at the Alaska Packers' Association canneries, and 1 mile beyond it attains a width of 2 miles. Four miles from the entrance is an island, 600 feet high, which contracts the lagoon on the side leading to the river to three-fourths of a mile. Southeast from this island are great mud-flats which are covered at high water. At a distance of 6½ miles from the entrance the lagoon contracts to one fourth of a mile, and a mile beyond it narrows to 100 yards. The upper trap is located here, and one-fourth of a mile beyond is the coal mine. In this locality the water is usually fresh, and the mouth of the river is practically in the vicinity of the upper trap.

The lagoon is shallow, the greater part uncovering at low water, exposing grassy flats, with a channel running along the eastern side as far as the cannery, where it breaks around a grassy middle ground, unites at the island, and continues to the river. One mile below the island the channel narrows to 100 yards, with a depth at low water of 4 feet. Above the island the flats are not so much exposed, but the channel is shoaler, 2½ to 3 feet being the best water through it at low tide. From the cannery the channel is buoyed. Bowlders brought down by the ice dot the flats here and there.

Outside the lagoon entrance the main channel is along the eastern shore, carrying about 3 fathoms at low water. There is also a narrow, shallow channel outside and along the spit, carrying 3 feet at low water, which separates the spit from a fan-shaped shoal, 1¼ miles long, which uncovers at low water and has a greatest width of three-fourths of a mile. At high water a small part of this shoal, near the spit, is just visible. Immediately within the entrance the water is deep and the banks are steep.

CHIGNIK RIVER.

Chignik River empties into the arm of the lagoon at its southwest end, and is estimated to be 6 miles in length, with an average width of 100 yards. The bottom is rocky and gravelly. High water, neap tides, extends to the coal mine, which is practically the mouth of the river, and high-water, spring tides, extends to the first lake, affecting the lake at the outlet a few inches. The depth in the river is such that a boat can ascend only at high water. At low water the current is very strong and forms many rapids.

There are two lakes. The first is about 10 miles long and of unknown depth. The banks in places are precipitous, in others sloping. In the latter localities the shore shelf is of sufficient width to permit gill netting, and then drops off suddenly. A number of small streams enter, but none except the second lake connection is of considerable size.

A shallow shifting arm, from 100 to 300 yards wide, leads through an extensive bog at the head of the lake, for a distance of 10 miles, to a second lake. The bog is

SALMON CANNERY OF PACIFIC STEAM WHALING COMPANY AT ANCHORAGE BAY.

black volcanic mud and probably the result of filling an old lake bed, which may have formed another lake connection in early times. The second lake is nearly of equal size with the first, but is shallow, with muddy bottom, the water here inclining to be muddy, while the water in the first lake is clear. A large part of the banks are low, but there are some bluffs on the northern side which continue some distance. A number of small streams enter the lake, and one of considerable size flows in from the northwest.

The redfish in immense numbers are said to spawn along the shore shelf of the first lake and in the mouths of the entering streams. A few redfish and more cohoes make their way into the second lake. Dog salmon and humpbacks spawn in these lakes, but they also enter the small streams that flow into the lagoon. Sculpins, perch, and other fresh-water fish occur. In the stream above the traps there are no obstructions. Formerly fishing was carried on over the spawning-beds, but this method is now abandoned. While all the species of Pacific salmon enter the lagoon and river, yet those other than redfish are so few in number that they are not considered in the pack. In relative abundance they stand as follows: Redfish, humpbacks, cohoes, dog, and king. No steelheads are taken here.

Chignik River is essentially a redfish stream, and the canneries may be said to pack only redfish. Occasionally a few humpbacks are packed, but they are obtained principally from streams between Tuliumnit Point and Kupreanof Point. The pack of king and cohoes never exceeds a few hundred cases from Chignik River. The few that are taken are generally used on the cannery table and the bellies salted for home use, while the backs may be packed under some different brand. Other fish are taken to a small extent.

The run of redfish commences the first days of June (a few were taken in 1897 for local use on May 15), and continues until the last of August. The run is usually considered large enough to pack from the middle of June to the middle of August. Cohoes run from the middle of July until after the cannery closes; the watchmen say until November. Humpbacks run from July 20 to September 1, and dog salmon about the same time, though both are found scattering throughout the season. The king salmon run in very small numbers, and are taken about the same time as the redfish.

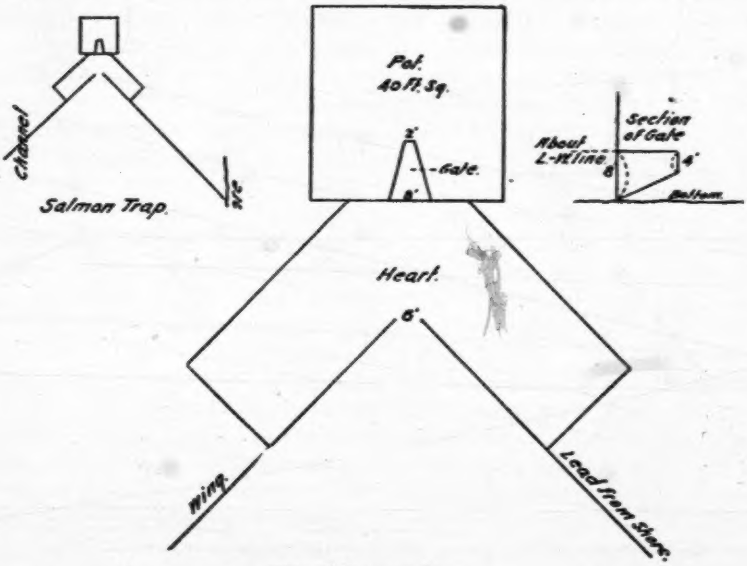
A very small salmon, weighing about 2 pounds, is recognized here as a different species, and called the Arctic salmon, but it is probably only a small redfish.

The weighing of 100 redfish from the bin gave the following results: Average 6.24 pounds, heaviest 10 pounds, lightest 4 pounds; average length 24 inches, largest 28 inches, smallest 21 inches. The red salmon in 1897 were said to run very small, 12 to the case; in 1896 they were larger, about 10 to the case.

One hundred cohoes were also weighed: Average 6.44 pounds, heaviest 10 pounds, lightest 2½ pounds; only one of each of these extremes, and a better range would be from 4½ to 9 pounds. Average length 23½ inches, greatest 28 inches, least 18 inches. The cohoes were running very small at the time of our visit, as it was the early part of the run, July 29.

The dog salmon run larger; that is, the average is higher, as there seemed to be few small ones. The humpbacks averaged about 3½ pounds in weight. The average weight of the king salmon at Chignik is unknown, but they were said to run very small for that species, though individuals weighing 60 pounds are reported to have been taken.

The fish are taken in traps, seines, and gill nets, and transported to the canneries on large lighters or fish-scows. It is said that the water is too clear for gill nets, and in 1897 they were not used by the Alaska Packers' Association or the Pacific Steam Whaling Company canneries, yet the Hume cannery seems to have been very successful with them. Traps are principally used here, and form the great bone of contention. At the time of our visit, July 29 to August 2, there were five traps outside the entrance to the lagoon, two just inside, and sixteen from the island to the head of the arm. They usually consist of a pot 30 to 40 feet square, with a heart and V-shaped leaders from 300 to 1,500 feet long, arranged with the apex up stream. The mesh of pots is 3-inch, and of leaders usually 4-inch. They are nowhere placed entirely across the main channel in the lagoon, but there are two or three which close up the shallow channel along the spit on the outside. In passing up the lagoon it seems almost impossible for any fish to reach the river, for it looks as though a forest of traps obstructed the whole passage. With two exceptions, one end of the leader is connected with the high-water mark on shore.



Chignik Lagoon Trap.

The leaders or wings consist of nets hung on the upper side of rows of piles driven in a V shape, with a small opening in the upper end. This opening varies from 4 to 8 feet. The heart is formed by piles driven in an irregular box shape, inclosing the ends of the leaders. The nets are hung on the upstream side and, like those of the ends, are made fast at the top only, the bottom being weighted. They reach from above high water to the bottom. The pot is above the heart and is a square net bag, hauled out to piles at the corners, above and below, by ropes running through blocks. On its lower side is the gate, which is the entrance from the heart to the pot. It is a net stretched on framework, or having a frame at each end, the upper end being much smaller than the lower. It is 6 to 10 feet wide at its lower end, 1½ to 2 feet wide at its upper end, depending on the size of the trap. The top of the gate varies in its distance above low water, as does the bottom at the upper end below low water, depending on the depth of water at the pot. The trap fishes during ebb tide only, the loose bottom allowing it to clear itself of most of the grass during flood tide. The fish are taken out just after low water. The upper end of the gate is triced up, one side of the pot lowered, and a boat worked sideways into the pot, the lines holding the bottom corners being let go, and the net underrun until the fish are in a small space between the boat and the other side of the pot. They are then either scooped out with a scoop net having a handle balanced on the gunwale of the boat or are hooked out with a short hook on a handle about 2 feet long. If cod, flounders, etc., are numerous enough to interfere, they are hooked out; if not, the upper end of the net is let go and the flood tide clears the pot. Four men are required for each of the larger traps. Their principal work is to keep the traps as free as possible from grass and to repair breaks in the net caused by the weight collected, as well as to replace piles carried away in the deeper water by the strong tide. The traps are taken up after the fishing season is over, and changes are constantly made in their size and arrangement during the fishing season.

Seines are hauled on the flats southwest of the island, and on the western shore opposite, where a gill-net crew is also located. The shores are usually rocky or grassy flats. The outside beach on the spit is fine sand and gravel.

It is evident to anyone who examines Chignik Lagoon during the packing season that the place is overfished. For many years one organization fished here and made a pack averaging 61,400 cases, from 1890 to 1896. In the latter year two more canneries were built by rival companies, and all expect to make the pack from the product of one stream. The result is that all kinds of practices are resorted to, and the overtaxed stream must suffer by this excessive fishing. The traps are so close together and occupy so much of the channel that they look almost like barricades, but the stream is not entirely barricaded, probably because all would not be benefited alike. In some instances the tunnels or gates of the traps are lifted during the weekly close season, and in others they are not.

Locally it is said that the stream will stand a yearly pack of 100,000 to 150,000 cases. In my opinion 50,000 cases is all that can be taken here by fair legal fishing. In 1896, 87,769 cases were packed; in 1897, 74,159 cases. The 1896 pack, however, included about 20,000 cases of Karluk fish, and in both years a small pack of humpbacks from other localities was made. When the redfish cease to run in sufficient numbers for packing, about the middle of August, the Chignik canneries clean up and close for the season.

ORZENOY.

In 1889 a cannery, under the title of the Western Alaska Packing Company, was built at Orzenoy, on the western side of Stepovak Bay, south side of the Alaska Peninsula, and packed that year 6,400 cases. In 1890 a pack of 2,198 cases was made. As the locality proved unfavorable on account of the scarcity of fish, the cannery was dismantled in 1891 and the site abandoned.

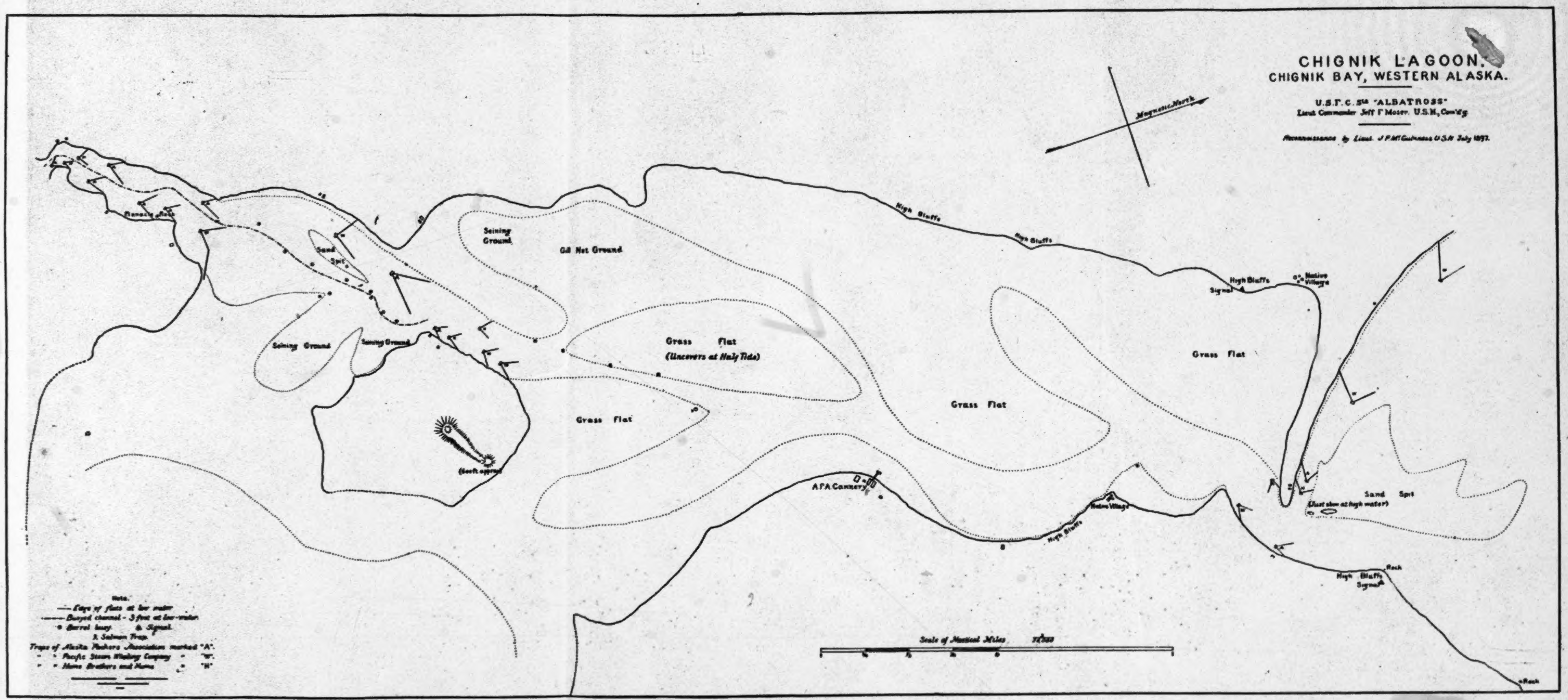
THIN POINT.

Thin Point is on the southern side of the Alaska Peninsula, near its extreme western end. Two canneries were formerly located here, but they have been removed and the site is practically abandoned. A saltery was operated at Thin Point for several years, until the Thin Point Packing Company was organized by Messrs. Louis Sloss & Co., of San Francisco, and the cannery was built in 1889. It was operated in 1889, 1890, and 1891, and was closed after that date. In 1890 the cannery ship *Oneida*, en route for Thin Point, was lost on the Sannaks in April; there were 77 Chinese on board and nearly all perished. A small pack of 2,401 cases was made that year. In 1892 it entered the pool of the Alaska Packing Association, and in 1893 became a member of the Alaska Packers' Association. In 1894 the cannery was moved to the Naknek River, Bering Sea, and utilized in the construction of the cannery of the Arctic Packing Company.

The Alaska Packers' Association operated a saltery at Thin Point in 1894, 1895, and 1896, but the place is now abandoned.

The cannery of the Central Alaska Company moved to Thin Point in 1890 from Little Kayak Island, and has already been referred to.

The main stream fished by these canneries is near at hand, on the eastern side of the point. There are two lakes near the sea, said to be well adapted for hatchery purposes. The stream is very uncertain; some years a large pack can be made from it, and then for a number of years the run is small. A person who had operated one of the canneries stated that the stream would yield at least 50,000 large redfish, and usually a larger number. As the place had been abandoned, it was not visited.



CHIGNIK LAGOON.
CHIGNIK BAY, WESTERN ALASKA.

U.S.F.C. Str. "ALBATROSS"
Lieut. Commander Jeff F. Moser, U.S.N., Com'dg.

Reconnaissance by Lieut. J. P. McGuinness U.S.N. July 1897.

Magnetic North
Pinnacle Rock
Sand Spit
Seining Ground
Gill Net Ground
Seining Ground
Seining Ground
High Bluffs
High Bluffs
High Bluffs
Signal
Native Village
Grass Flat
(Uncovers at Half Tide)
Grass Flat
Grass Flat
Grass Flat
(6 ft. approx)
A.P.A. Cannery
Native Village
High Bluffs
Sand Spit
(Just show at high water)
Rock
High Bluffs
Signal
Rock
Scale of Nautical Miles 72,000
Note.
Edge of flats at low water
Buoyed channel - 3 feet at low-water
Barrel buoy. Signal.
Salmon Trap.
Traps of Alaska Packers Association marked "A".
" " Pacific Steam Whaling Company " "W".
" " Hume Brothers and Hume " "H"

BERING SEA DISTRICT.

The following brief histories and statistics of the Bering Sea canneries have been largely furnished by the Alaska Packers' Association, time not permitting a visit.

From the table of percentages of packs for the different districts, it will be seen that 35.2 per cent of the Alaska pack was made in Bering Sea in 1887. By the increase of canneries in other districts in 1888, and the still larger increase in 1889, the percentage of pack fell off and reached its lowest point (13.4 per cent) in 1892. From that date the percentage of pack has gradually increased until, in 1897, it reached 28 per cent of the whole Alaska pack, of which over nine-tenths was packed by the Alaska Packers' Association.

All the canneries in Bering Sea are located on the Nushagak, Kvichak, Naknek, and Ugashik rivers, all emptying into Bristol Bay (see Chart B).

NUSHAGAK RIVER.

On the Nushagak there are four canneries, as follows: Arctic Packing Company, Nushagak Packing Company, Bristol Bay Canning Company, and Alaska Packing Company. There is also a saltery operated by C. E. Whitney & Co., which in 1897 salted 2,436 barrels, principally redfish.

In 1883 the schooner *Neptune*, with a party, prospected for salmon on the Nushagak, and salted a large number. The same year cannery buildings were erected for the Arctic Packing Company, which was formed and commenced operations in 1884, making a pack of 400 cases that year. This was the first cannery operated in Bering Sea. It has made a pack every year to date, except in 1892, when it joined the pool of the Alaska Packing Association and was closed. In 1893 it became a member of the Alaska Packers' Association. The cannery is located at Kanulik, on the eastern shore, at the mouth of the river, and about 3 miles above Fort Alexander. It has a capacity of 2,000 cases a day.

The Alaska Packing Company built a cannery on the western shore of the Nushagak, near the mouth, in 1886, and made a pack that year, as it has done every year since. It entered the pool of the Alaska Packing Association in 1892, and the Alaska Packers' Association in 1893. It is located near the village of Kanakanak, and has a capacity of 2,000 cases a day.

The Bristol Bay Canning Company built a cannery immediately above that of the Alaska Packing Company in 1886, and operated that year and every year to date. It entered the pool of the Alaska Packing Association in 1892, and of the Alaska Packers' Association in 1893. It has a capacity of 2,000 cases per day.

The Nushagak Packing Company built a cannery on the eastern shore of the estuary at Nushagak in 1888, at a place called Stugarok, 11 miles below Fort Alexander. It was operated in 1888, 1889, 1890, and 1891; it was then closed and has not been operated since. It joined the pool of the Alaska Packing Association in 1892 and became a member of the Alaska Packers' Association in 1893. It is in such condition that it can be operated at short notice, and is held as a reserve. Its capacity is 1,500 cases per day.

These canneries are all owned and operated by the Alaska Packers' Association, and are under one local management. In 1897 they employed 144 white fishermen, 38 white cannery-hands, 306 Chinese, and 40 natives. Sixty gill nets were used, each 125 fathoms long by 24 meshes deep; 120 gill nets, each 75 fathoms long by 24 meshes deep; 4 traps with 300 feet leaders.

The following vessels were employed:

Rig.	Name.	Net tons.	Crew.	Value.
Steamer	Polar Bear	29	5	$12,000
Launch	Tyone	5	2	4,500
Do	Amy S	5	2	3,000
Do	Corinne	5	2	1,500
Ship	Sterling	1,637	Fishermen.	30,000
Do	Eclipse	1,535	(?)	Chartered.
Barkentine	Willie R. Hume	632	(?)	Do.
98 boats and lighters.				

The following gives the output of the three canneries for 1897:

Species.	Number of fish.	Number of cases.	Number of fish per case.	Barrels salted.
King salmon	18,139	5,823	3	32
Redfish	1,240,080	88,791	14	178
Cohoes	150,000	10,119	14.8	
Humpbacks	35,348	3,123	11.3	
Total		107,856		

Of the above, the Bristol Bay Canning Company packed 34,117 cases, the Alaska Packing Company 37,849 cases, and the Arctic Packing Company 35,890 cases.

The traps are used in Wood River, which empties into the estuary above the canneries on the western bank; the gill nets are used in the estuary where the water is muddy. No seines are used.

KVICHAK RIVER.

To the eastward of the Nushagak and emptying into the head of Bristol Bay is the Kvichak, with one cannery and one saltery.

The Prosper Fishing Company established a saltery at the mouth of the Kvichak in 1894 and operated it that year and the following. It was sold in 1896 to the Alaska Packers' Association and closed.

Under the name of Point Roberts Packing Company the Alaska Packers' Association established and operated a saltery at Koggiung on the Kvichak River in 1894, and built a cannery the following year, utilizing in its construction the available machinery from the cannery of the Central Alaska Company at Thin Point. It was first operated in 1896, and also packed in 1897. It is said to have a capacity of 2,000 cases per day. In 1897 the company employed 65 white fishermen, 10 white cannery-hands, 150 Chinese, and 25 natives. Twenty-five gill nets were used, each 60 fathoms long by 30 meshes deep, and 4 traps, with the inside leaders 300 feet long and outside leaders 250 feet long.

The following vessels were employed:

Rig.	Name.	Net tons.	Crew.	Value.
Steamer	President	238	8	$49,000
Launch	Northern Light	5	2	3,000
Do	J. W. Clark	5	2	2,000
Ship	Bohemia	1,529	Fishermen.	30,000
Bark	W. W. Case	556	Fishermen.	10,000
32 boats, lighters, and scows.				

The following is the pack for 1897:

Species.	Number of fish.	Number of cases packed.	Number of fish per case.	Barrels salted.
King salmon	345	126	2.7	220
Redfish	760,652	55,382	13.7	1,489

NAKNEK RIVER.

Naknek River empties into the upper part of Bristol Bay, about 20 miles below Koggiung. There are two canneries at its mouth.

The Arctic Packing Company built and operated a saltery at Naknek in 1890 and sold it to the Alaska Packers' Association in 1893. The association in 1894 built a cannery at the same place, utilizing the machinery of the Thin Point Packing Company in its construction. It was operated in 1895, 1896, and 1897, and has a capacity of 1,800 cases per day. Salmon are also salted here.

In 1897 the company employed 45 white fishermen, 10 white cannery-hands, 102 Chinese, and 10 natives. They used 11 gill nets, each 70 fathoms long by 24 meshes deep; 34 gill nets, each 70 fathoms long by 22 meshes deep; 3 traps with leads of 175 feet. The vessels employed were the launch *Ralph L.*, of 5 tons, with a crew of 2, and valued at $4,500; the bark *Merom*, of 1,159 net tons, with a crew of fishermen, valued at $16,000; the schooner *Prosper*, of 230 net tons, with a crew of fishermen, valued at $15,000; also 30 boats and lighters. The bark *Merom* made one trip on account of Karluk.

The following gives the pack for 1897:

Species.	Number of fish.	Number of cases packed.	Number of fish per case.
King salmon	902	180	5
Redfish	429,655	34,496	12.4

In 1890 Mr. L. A. Pederson established and operated a small saltery on the northern shore of the Naknek River near its mouth, and in 1894 the Naknek Packing Company was incorporated under the laws of the State of California, a cannery being built on the site of the saltery. The first pack was made in 1895, and operations were continued in 1896 and 1897. Salting is also carried on by this company. In 1897 an additional saltery was built on the shore of Bristol Bay about 2 miles above the mouth of the Naknek. The cannery has a capacity of 1,500 cases per day.

In 1897 the company employed 40 white fishermen and salters, 10 white cannerymen, 75 Chinese, and about 10 natives. The following was the equipment: 27 gill nets, each 100 fathoms long by 20 meshes deep, 6¼-inch mesh, valued at 40 cents per fathom; 3 gill nets, each 100 fathoms long by 20 meshes deep, 8½-inch mesh, valued at 40 cents per fathom; also 2 seines each 60 fathoms long, 100 meshes deep at bunt and 60 at ends, 3-inch mesh, worth $1.25 per fathom (used to empty trap); 1 double trap leading out 100 fathoms from beach in front of cannery, with two wings from the pot, 50 fathoms each in length, one up and the other down stream; width of pot, 20 feet; value, $600.

The vessels and boats were the launch *Emilia*, of 5 tons, with a crew of 2, and valued at $1,200; the bark *B. P. Cheney*, of 1,200 tons, with a crew of fishermen, and valued at $14,000; 1 lighter at $700; 6 lighters at $300 each; 1 pile-driver with engine valued at $300; 20 double-ended gill-net boats at $90 each.

In 1896 the company employed 36 white fishermen and salters, 6 white cannery-hands, 62 Chinese, and 10 natives. The remaining statistics are about the same as for 1897, except that the large lighter valued at $700 was new in 1897, and only 16 gill-net boats and 22 gill nets were used. The bark *Ferris S. Thompson*, of 514 tons, was chartered for transport.

The pack for 1897 consisted of 216,500 redfish, of which 215,000 were taken in gill nets and 1,500 in traps, making 18,000 cases, or 12 fish to the case. 16,000 of these fish were taken outside, the remainder in the river. Packing began June 30, and finished August 1. At the saltery 501 barrels of redfish were salted, 48 fish to the barrel, between July 1 and 14, and 99 barrels at the cannery.

In 1896 8,600 cases were packed from July 2 to August 2, all redfish, averaging 12 to the case. 175 barrels of redfish were salted to order.

The following redfish, running 48 to the barrel of 200 pounds, and all taken in the lower Naknek River, have been salted by this company since the station was opened: 225 barrels in 1890; 450 barrels in 1891; 1,100 barrels in 1892; 2,600 barrels in 1893; 2,630 barrels in 1894; 200 barrels in 1895.

EGEGAK FISHING STATION.

Egegak fishing station, also called Igagik and Ugaguk, is about 34 miles south of Naknek. In 1895 the Alaska Packers' Association established and operated a saltery at the mouth of the river, and have salted there each year since. In 1897 the company employed 10 white fishermen, 16 white saltery-hands, and 6 natives. Five gill nets were used, each 75 fathoms long by 26 meshes deep, and 2 traps with leads of 800 feet. The vessels and boats were the launch *Minnie*, of 5 tons, with a crew of 2, and valued at $1,600, and 9 boats and lighters. The three-mast schooner *Premier*, of 292 tons, with a crew of fishermen, and valued at $15,000, was used as a transport.

In 1897 this company salted 257 king salmon, making 15 barrels, and 203,458 redfish, making 3,574 barrels.

UGASHIK RIVER.

The Ugashik, or Sulima River, as it is sometimes called, is 70 miles south of Naknek, and is the most southerly station on Bristol Bay. There are two salteries and two canneries on this river.

The Bering Sea Packing Company, a branch of the Alaska Improvement Company, but a separate corporation, built a cannery at Ugashik in 1891, and operated it that year. It was closed in 1892 and in 1893, and operated in 1894, 1895, and 1896. It was neither in the pool of the Alaska Packing Association of 1892, nor did it join the Alaska Packers' Association in 1893. It was purchased by the latter organization in the spring of 1897 and closed. It has a capacity of 1,200 cases per day, and at present is held as a reserve.

A saltery was established and operated at Ugashik in 1893 by the Alaska Packers' Association, and continued as such in 1894 and 1895. In the latter year the association built a cannery, utilizing in its construction the available machinery from the cannery of the Russian-American Packing Company at Afognak. It was operated in 1896 and 1897, and has a capacity of 1,800 cases per day.

At the Ugashik fishing station in 1897, 59 white fishermen, 9 white cannery-hands, 102 Chinese, and 24 natives were employed. Twenty-one gill nets were used, each 75 fathoms long by 24 meshes deep; also, one trap 150 feet inside leader, 80 feet outside leader, and 1 trap 250 feet inside leader, 80 feet outside leader.

The vessels and boats were the steamer *Thistle*, of 55 tons, with a crew of 6, and valued at $25,000; the launch *Cathie K*, of 5 tons, with a crew of 2, and valued at $2,500; the bark *Coryphene*, of 771 tons, chartered; also 53 boats and lighters.

The pack in 1897 consisted of 259 king salmon, making 11 cases (nearly all consumed fresh); 463,698 redfish, making 38,261 cases, or 12 to the case. 138 barrels were salted.

Mr. C. A. Johnson established a saltery at Ugashik in 1889, and has salted every year to date. The names of Norton, Teller & Co., and Metson & Co. frequently appear in connection with this saltery in the lists. They are simply the saltery agents.

Mr. Charles Nelson established a saltery at Ugashik in 1893, and operated it that year and in 1894. In 1895 it was sold to the Alaska Packers' Association and closed.

TOGIAK AND PORT MOLLER.

Togiak is on Togiak Bay, to the westward of Bristol Bay, between Cape Constantine and Cape Newenham. In 1895 the Alaska Packers' Association established a saltery here, which was operated in 1895 and 1896, and then abandoned.

At Port Moller, on the northern side of the peninsula, in longitude 160° 40′ W., Captain Herendeen salted salmon in 1886 or 1887.

WAGES IN BERING SEA DISTRICT.

The Chinese and fishermen's contracts for Bering Sea are similar to those referred to in other localities. The following for one cannery will give a fair idea of their value:

The Chinese receive free transportation and furnished quarters (without bedding), fuel, water, and salt. They are paid 42 cents per case. The boss receives $50 per month in addition to his lay, and the tester receives the same.

The fishermen receive $25 for working the vessel to the cannery and a like amount for taking her back. Two men form a gill-net crew, and the boat is paid 2 cents per fish. They are furnished everything except clothing, from the time they go on board the vessel until discharged.

Saltery gangs are paid at the rate of $30 per month and 15 cents a barrel (of 200 pounds) for the gang collectively.

The beach gang receives $40 per month per man, and, if detailed for fishing, in addition to this pay, receives ½ cent per fish. A cook and boy are provided to run the mess.

The natives are paid in various ways, but average from $1, the lowest, to $1.50 per day.

The Bering Sea season is short, and the pack must be made in from three to five weeks. The cans are usually carried to the canneries made up, and when the fish are running, work is continued day and night. The operations are carried on with no little danger. The tide rushes in and out of the head of Bristol Bay with great velocity, and in the estuaries bores are formed, which have caused the loss of a number of lives. After the pack is completed much difficulty is frequently experienced in loading it on the transporting vessel, on account of the strong currents and bad weather.

The *Albatross* visited the Nushagak in 1890, and spent some time there. The four canneries were in operation that year, and the Fish Commission report for 1889–1891 gives considerable information as to the fisheries of the region, on pages 284–287.

LIST OF ILLUSTRATIONS.

To face page.

CHART A.—Dixon Entrance to Head of Lynn Canal, showing Locations of Salmon Canneries and Salteries and the principal Salmon Streams 48

CHART B.—Cape Suckling to Unimak Pass, showing locations of Salmon Canneries and Salteries and the principal Salmon Streams 48

To face page.

PLATE 1. Falls in Stream at Skowl Arm, Kasaan Bay, Southeast Alaska 1

2. Photographing under Difficulties, near Loring 4

3. Humpback Salmon from Stream at Head of Uganuk Bay 8

4. Lake, West Branch of Skowl Arm, looking up. Spawning-beds in Stream, Skowl Arm, Kasaan Bay 12

5. Cannery at Boca de Quadra. Salmon Saltery on Thorne Bay 16

6. Salmon Saltery, Ketchikan 20

7. Cannery at Loring 24

8. West Branch of Skowl Arm. Barricade in West Branch of Skowl Arm 34

9. Barrier in Salmon Stream at Head of Nichols Bay. Barricade in Salmon Stream near Hessa 34

10. Second Barrier in Stream at Helm Bay. Dam in Outlet to Lake, Redfish Bay 34

11. Barrier in Stream at Helm Bay 34

12. Old Fish-Lead in Stream at Karta Bay 34

13. Barrier in Stream at McDonald Bay. Fish Trap in McDonald Bay 34

14. Barrier in Stream entering First Inlet, south side of Moira Sound. Indian Fish Trap and artificial Channel in Stream, First Inlet, south side of Moira Sound 34

15. Barrier across Stream at North Arm, Moira Sound. Old Barrier Fences and Indian Fish Traps, Karta Bay 34

16. Obstruction at Klakas from above. Obstruction at Klakas from below 34

17. Totems at Kasaan Village. Cascade in Stream, Ketchikan 40

18. Indian Grave and Totems, Klinkwan 42

19. Oil and Guano Factory at Killisnoo. Gill net set by Natives, Lake Eyak 44

20. Stream at M'Donald Bay, looking into Small Lake. Mouth of Stream draining Lake near Mink Arm, Boca de Quadra 60

21. Lake near Boca de Quadra 62

22. Outlet of Lake near Mink Arm, Boca de Quadra. Rapids in Stream, Ketchikan 64

23. Salmon Cannery, Metlakahtla. Stream at Nichols Bay 66

24. Salmon Stream, east side, Port Chester. Salmon Cannery, Hunter Bay 68

25. Lake at Nichols Bay. Looking up Lake from near Outlet 70

26. Lake at Hessa. View from near Outlet, looking toward Head 72

27. Outlet of Lake at Hessa 72

28. Outlet of Hetta Lake, from above 74

29. Kasook Lake, from Outlet 76

To face page.

PLATE 30. Fishing Camp, south side of Moira Sound. A Tributary to Hetta Lake 78

31. Widening of Stream draining large Lake, north side of Moira Sound. Spawning-beds in Stream near head of South Arm, Moira Sound 80

32. Lake near Niblack Anchorage. View up Lake. Cascade in Stream draining Lake near Niblack Anchorage 82

33. Lake No. 1, Dora Bay, looking toward Outlet 84

34. Lake No. 2, Dora Bay, looking toward No. 1. 84

35. Lake near Karta Bay 88

36. Fishing Huts on Skowl Arm, Kasaan Bay. Stream at Dora Bay, looking out 90

37. Stream at Helm Bay 92

38. Cannery at Loring 96

39. Flat along Thorne Bay Stream 100

40. Head of Tidewater Stream at Thorne Bay 102

41. Stream at Thorne Bay 104

42. Waterfall in Stream at Duncan Canal about 1 mile from mouth. Mouth of Stream, Duncan Canal, showing Gravel Beds 106

43. Kah-Sheets Stream. Stream at Loring 108

44. Hatchery at Klawak. Cannery at Klawak. 110

45. Cannery near Wrangell. View of Klawak, looking west 112

46. Cannery at Redfish Bay 116

47. Gorge at head of Redfish Bay. Cascade near Hatchery, Redfish Bay 120

48. Cannery at Pyramid Harbor 124

49. Killisnoo. Yakutat 128

50. Cannery at Orca 130

51. Cannery at Lake Eyak 136

52. Saltery at Head of Uganuk Bay, Kadiak Island. Rear view of Cannery at Kussilof, Cook Inlet 140

53. General View of Karluk, Kadiak Island, showing Spit, River, Lagoon, and Village. 144

54. Outer Shore, Karluk Spit, Kadiak Island—View from East Hill 148

55. Seining at Karluk. A. P. A. Cannery at Chignik Bay 152

56. Unused Salmon Cannery at Tanglefoot Bay, near Karluk 154

57. Redfish Hatchery at Karluk 156

58. Cannery at Uyak Bay 158

59. Native Village on Uganuk Bay 160

60. Summer Fishing Village on Stream at head of Uganuk Bay 162

61. Pound Net in Chignik Bay 164

62. Salmon Cannery of Pacific Steam Whaling Company at Anchorage Bay 168

63. Chignik Lagoon, Chignik Bay, Western Alaska 172

TEXT CUTS.

	Page.
Red Salmon (Oncorhynchus nerka)	5
King Salmon (Oncorhynchus tschawytscha)	7
Coho or Silver Salmon (Oncorhynchus kisutch)	8
Humpback Salmon (Oncorhynchus gorbuscha). Sea-run	9
Dog Salmon (Oncorhynchus keta)	10
Steelhead (Salmo gairdneri). Adult	11
Red-throated Trout (Salmo mykiss). Adult	14
Dolly Varden Trout (Salvelinus malma)	15
Transport Ship at Chignik	16
Cannery at Chilkat	18
Fish Scow at Dock, Chignik	19
Stern-wheel Steamer used in towing Fishing Boats and setting Nets, Chignik	20
Cutting Machine	23
Filling Machine	24
Topping Machine	25
Soldering Machine	26
Test Kettles	27
Retorts and Test Kettles	28
Cooling a Day's Pack	29
Lacquer Room	30
Redfish Hatchery at Karluk	35
End view of Barricade, showing Method of Construction	37
Catch of Halibut on deck of steamer Albatross, near Killisnoo	44
Cleaning Halibut on deck of steamer Albatross, near Killisnoo	45
Halibut (Hippoglossus hippoglossus)	46
Herring (Clupea pallasi)	47
Sketch of Hunter Bay Lake System	69
Sketch of Klakas Stream and Lake	70
Sketch of Nichols Bay Lake System	71
Hessa Lake and Outlet	72
Saltery at Kassook	76
Sketch of Kegan and Outlet	79
Sketch of Vicinity of Old Johnson Stream	81
Sketch of Nowisk-Kay Stream	82
Sketch of Kithraum Stream	84
Sketch of Old Tom Stream	85
Sketch of Brown & Johnson Stream	86
Skeleton of Floating Fish-house at Skowl Arm	87
Sketch of Karta Bay Stream	89
Sketch of Helm Bay Stream	91
Naha Bay and Lakes	95
Sketch of Yes Bay Stream and Lakes	98
Sketch of Stream at head of Thorne Bay, taken at low water	101
Cannery near Wrangell	104
Sketch of Kah-Sheets Stream	108
Sketch of Klawak Stream and Lake	112
Plan of Klawak Hatchery	114
Sketch of Redfish Bay Lake	118
Hatchery at Redfish Bay	119
Sketch of Herring Trap at Kootznahoo Inlet	122
Sketch of Vicinity of Orca and Odiak	133
Sketch of Lake Eyak	135
Fish-wharf on Lake Eyak	136
Sketch of Kussilof River and Vicinity	142
Sketch of Vicinity of Little River	159
Cannery at Uganuk Bay	160
Sketch of Uganuk Stream	161
Chignik Lagoon Trap	170

INDEX.

Page.
Aberdeen Packing Co 16, 103
Afognak Island 163
Alaska Commercial Co 144
Alaska Fur Trading Co 144
Alaska "Grapes" 123
Alaska Herring 123
Alaska Improvement Co 17, 149, 176
Alaska Oil and Guano Co 121–123
Alaska Packers' Association 3, 4, 19, 20, 21, 157
Alaska Packing Association 19
Alaska Packing and Fur Co 17
Alaska Packing Co 16, 141, 173
Alaska Salmon Canneries, Establishment of 16–21
Alaska Salmon District, Charts of 48
Alaska Salmon Laws 38-42
Albatross, Fishing and Collecting by 45–48
Aleutian Islands Fishing and Mining Co 17, 149
Alexander, A. B 2, 3
Algonek Slough 132
Alitak Bay 157
Alsek River 129
Anan, Bradfield Canal 107
Anchorage Bay 166
Annette Island 66
Annual per cent value of total Salmon Pack of Alaska, 1878 to 1897, Tabular Statement 53
Arctic Fishing Co 16, 142
Arctic Packing Co 16, 17, 157, 160, 173, 175
Astoria and Alaska Packing Co 17, 121
Ayaknlik 146
Badger Bay 62
Banter & West 75
Baranof Island 121
Baranof Packing Co 17
Baronovich Fishery 87
Barricades at Afognak 163
in Salmon Streams 36, 37, 71, 72, 78, 82, 86, 88, 91, 99
Bartlett Bay 124
Bartlett Bay Packing Co 17
Bean, Tarleton H 144
Bear Island 158
Bell, Robert 47, 102
Bering Sea District 173–178
Bering Sea Packing Co 17, 176
Bielaya ryba 5
Big River 133
Billy's Hole 138
Blueback Salmon 5
Boca de Quadra 62
Booth, Franklin 144
Boston Fishing and Trading Co 17
Brands and Labels 32
Bristol Bay Canning Co 16, 173
Brockman, Fred 116
Brown & Johnson's Stream 86
Burroughs Bay 100

Page.
Callbreath, J. C 10, 12, 109
Canneries of Karluk District 148
Cannery Fishermen 23
Canning Processes 26
Cans and Boxes for Canned Salmon 33
Cape Edward Bay 121
Cape Fox Packing Co 16, 62, 64
Cape Lose Packing Co 17
Carroll Inlet 68
Central Alaska Co 17, 172
Chamberlain, F. M 3
Charts of Alaska Salmon Districts 48
Choeats 100
Cheniga 132, 138
Chignik Bay 164
Chignik Bay Combination 18
Chignik Bay Packing Co 17
Chignik Lagoon 168
Chignik River 168
Chilkat 125
Chilkat Canning Co 17
Chilkat Packing Co 16
Chilkat River 127
Chilkoot Inlet 125
Chilkoot River 127
Chinese Labor at Salmon Canneries 23, 93, 110, 117, 126, 131, 142, 150, 152, 107
Chinook Salmon 5
Cholmondeley Sound 84
Chouicha 5
Clams at Klawak 111
Clark & Martin 62, 64, 65
Clark, George W 64
Clarence Strait Halibut Ground 46
Close Season for Salmon 40
Codfish 124
Coho 3, 5
Collecting and Fishing by the Albatross 45–48
Columbia Salmon 5
Common names of Alaska Salmon 5
Cook Inlet District 140–143
Copper River 133
Coquenhena 130
Cordova Bay 68
Cottonwood Point 133
Crowley, D. W 97
Cutting Packing Company 16, 23, 88, 102
Dall Harbor 69
Depletion of Salmon Streams 34–37
Description of Salmon Stream during Spawning Season 12
Dolly Varden and Cut-throat Trouts destructive of Salmon Spawn 15
Dolly Varden Trout 15, 128
Doris Bay 103, 165
Drag Seines 22, 94, 95

Page.
Drifting Gill Nets 22
Duke Island 68
Duncan, William 66
Eeke 116
Eeke Inlet 75
Egegak Fishing Station 176
Equipment of Karluk Canneries 149
Essawa 69
Establishment of Salmon Canneries in Alaska 16-21
Etolin Island 75, 109
Extent and importance of Southeast Alaska District 61
Eyak Lake 132, 135, 136
Falls Creek 121
Fassett, H. C 3
Fictitious Cannery Names 32
Filling Machine 24, 28
Fish Creek 65
Fish Hatcheries in Alaska Region 10, 38, 63, 70, 75, 83, 109, 113, 120, 155, 163
Fish Traps 116, 161
    at Cook Inlet 143
    at Uganuk 150
Fishermen at Salmon Canneries 23
    in Karluk Region 152
Fishermen's Packing Co 165
Fishing and Collecting by the Albatross 45-48
Fishing-ground of Karluk Region 146
Fraser River Salmon 5
Garrett, L. M 3
George Inlet 68
George W. Hume Cannery 17
Gill nets 22, 45, 67, 105
    in Cook Inlet 143
    in Copper River 134
    in Metlakahtla Fisheries 67
Glacier River 132
Graham, S. V 3
Guano made from Herring 124
Gus Wilson Slough 133
Gut Bay 121
Halibut trials by the Albatross 45
Harvester Island 158
Hatcheries in Alaska Region 10, 38, 63, 70, 75, 83, 109, 113, 120, 155, 163
Helm Bay 91
Herring of Alaska 123
Herring packed at Killisnoo 124
Herring Trap at Kootznahoo Inlet 122
Hessa 116
Hessa Inlet 72
Hetta Inlet 73
Hume-Aleutian Compact 149
Hume Bros. & Hume 17, 18, 166
Hume Canning and Trading Co 17, 149
Hume, George W 141
Hume Packing Co 17, 149
Humpback Salmon destructive of Redfish Eggs 15
Hunter Bay 68
Hunter Bay Region 77
Illegal Fishing at Karluk 147
    for Salmon 34
Improvement in Method of Fishing at Karluk 153
Indian Barricades of Salmon Streams 37
Indian Labor at Salmon Canneries 24, 25, 109, 117
Indians, Relations to Salmon Fisheries 43
Itinerary of the Albatross 2
Jackson Bay 138

Page.
Jack Pot Stream 138
Kaguyak 147
Ka-heho 116
Kah-Shakes 62
Kah-Shakes Cove 64
Kah-Sheets 106, 108
Kaknu River 140
Karluk 144
Karluk and Chignik District 144-172
Karluk Hatchery 155
Karluk Packing Co 16, 148
Karluk River 145
Karluk River Fisheries 18, 148, 149
Karta Bay 87
Karta Bay Stream 89
Kasaan Bay Stream 85
Kassook 116
Kassook Inlet 76
Kegan 78
Kenai 130, 140
Ketchikan 64
Killisnoo 121-125
Kina 90
King Salmon 99, 106, 124, 131, 134
Kinney, M. J 62, 125
Kisutch 5
Kithraum Stream 84
Kiuk River 143
Klakas 116
Klakas Inlet and Stream 70
Klawak 109-115
Klawak, Cannery at 16
Klinkwan 70
Klootchmen 3, 24
Kluck 6
Kodiak Packing Co 17, 148, 157
Kootznahoo Inlet 123
Kosmikoff, Walter 109
Kou Bay 121
Krasnaya ryba 5
Kuiu Bay 121
Kukak 147
Kussilof River 141
Kvichak River 174
Labels and Brands of Salmon Canneries 32
Labor at Salmon Canneries 23, 93, 109, 110, 117, 126, 131, 142, 150, 152, 167
Ladd, C. D 143
Lake Bay 106
Lake Eyak 135-136
Larsen Bay 150
Late-spawning Salmon 12
Laws relating to Alaska Salmon 38-42
Lewis, R. E 144
Little Kayak Island 129
Little River 133, 147, 150
Little Whale Bay 120
Louis Sloss & Co 130, 172
Markets for Canned Salmon 32
Marten Arm 62, 64
Marten River 133
Mary Island 62
McCauley, Thomas 106
McDonald Bay 97
McGuinness, J. P 3
Metlakahtla 43, 66
Metlakahtla Industrial Co 17

Page.
Miller, James 100
Miner's River........ 132
Mink Arm 62
Mink Arm Stream........ 64
Mitchell Island........ 129
Morgan, David........ 125
Moira Sound 78
Moser, J. F., on the Salmon and Salmon Fisheries of Alaska 1-178
Mountain Slough........ 132
Mud Bay........ 165
Murray, Hugh 125
Naha Bay 92
Naha Stream........ 95
Naknek Packing Co........ 17
Naknek River........ 175
Necker Bay 120
New Metlakahtla........ 60
Niblack Anchorage 82
Nichols Bay........ 70
Nichols Bay and Tributaries........ 71
Northeast Harbor........ 147
Northern Packing Co 17, 141
North Pacific Trading and Packing Co........ 16
Northwest Trading Co........ 121
Nowisk-Kay 82
Nushagak Packing Co 17, 173
Nushagak River 173
Nutqua Inlet........ 73
Odiak 130
Offal in Karluk River........ 157
O'Hara Bay........ 121, 128
Oil made from Herring........ 124
Old Johnson Stream........ 80
Old Sitka, Cannery at........ 16
Old Tom Stream 85
Old Village........ 107
Olsen Bay........ 121, 128
Oncorhynchus gorbuscha........ 5
    keta 5
    kisutch 5
    nerka........ 5
    tschawytscha........ 5
Oneida, ship........ 172
Orca 131
Orr, Cyrus 108
Orzenoy........ 171
Output of Alaska Salmon Canneries, 1878-1897, Tabular Statement 51-52
Output of Alaska Packing Companies since Organization, together with Ownership in 1897, Tabular Statement........ 53
Output of Karluk Canneries........ 149
Pacific Packing Co........ 17, 130
Pacific Steam Whaling Co 17, 18, 21, 68, 131
Packing Clams at Klawak 111
Pack of Alaska Salmon in 1897, Table showing Cases and Percentage........ 6
Parmenter, H. E........ 3
Pederson, L. A 175
Peninsula Trading and Fishing Co........ 17
Percentage of Packs of Alaska Salmon Districts, 1878-1897 3
Pete Dahl Slough 133
Peter Johnson Stream........ 83
Pillar Bay Stream........ 121

Page.
Plan of Klawak Hatchery 117
Point Barrie 108, 121
Point Ellis 121
Point Roberts Packing Co 17, 174
Port Althorp........ 128
Port Bainbridge 138
Port Fildago........ 138
Port Gravina........ 138
Port Moller 177
Port Valdes........ 138
Prices of Canned Salmon 33
Prince of Wales Island, Northeast Side 106
Prince William Sound 137
Prince William Sound and Copper River Region.... 129-139
Processes at Salmon Canneries........ 26
Prosper Fishing Co 174
Purse Seines 22
Pyramid Harbor 125
Pyramid Harbor Packing Co........ 16, 125
Quadra Packing Co 17
Quadra Redfish, Size of 63
Quadra Stream and Lake........ 62
Queen, Steamer 46
Quinnat Salmon........ 5
Quisutsch........ 5
Rats Harbor........ 104
Red Bay........ 107
Redfish Bay........ 116-121
Redfish Hatchery at Karluk 35
Redoubt........ 120
Redoubt St. Nicolas........ 140
Red River........ 146
Regulation of Work in Karluk Canneries........ 152
Relations between Salmon Fisheries and Indians... 43
Relative Importance of Alaska Salmons 6
Retorts and Test Kettles........ 28
Revillagigedo Channel 62
Rhode & Johnson 97
Rights of Indians to Streams 22, 43, 74, 88
Royal Packing Co........ 17, 164
Rubber Boot Stream 138
Run of Salmon in Hunter Bay Region 77
Runs of Alaska Salmon...... 7, 74, 77, 96, 114, 139, 143, 147, 169
Russian-American Packing Co........ 17, 160, 164
Sacramento Salmon 5
Salmo mykiss 15
Salmon Bay 107
Salmon Canneries in Alaska, Establishment of...... 16-21
    operated in Alaska, 1878-1897, Tabular Statement........ 50
Salmon-canning Operations in Alaska, 1878-1897, Tabular Statement........ 49
Salmon Catch at Karluk 144
    Fishery and Cannery Methods........ 22-34
        Methods........ 22
    Hatchery near Karluk........ 155
    Inspectors 42
    Law........ 38
    Pack of Alaska Canneries for 1896, Tabular Statement........ 54
        of Alaska Canneries for 1897, Tabular Statement........ 55
    returning to Sea........ 14
    Runs........ 7, 74, 77, 96, 114
        at Karluk........ 147
    Sound........ 138

Page.
Salmon Traps 41, 170
Saltery at Burroughs Bay 100
    Kassook 76
    Klawak 109
    Naha Bay 92
    Nutqua Inlet 73
    Pillar Bay Stream 121
    Sukkwan 75
    Thorne Bay 102
    Ugashik 177
Saltery Statistics 60
Salting Salmon 21, 124
Salvelinus malma 15, 45
Sanborn & Ellmore 121
Sar-Kar 116
Saukeye 5
Saw-kwey 5
Saw-qui 5
Scandinavian Packing Co 165
Seal Rocks 146
Seines in Chilkoot River 128
    at Karluk 152
Shad 103
Shipley Bay 109, 121
Ships and Boats at Karluk 154
Shumagin Packing Co 17, 165
Shushitna River 143
Silver Salmon 5
Simpson Bay 138
Sitkoh Bay 121
Size of Salmon 169
Skowl 71
Skowl Arm 85
Skowits 5
Smith Bay 121, 128
Smith & Hirsch 16, 148
Snug Harbor 158
Sockeye 5
Soldering Machine 26
Somerset River 138
Southeast Alaska District 61-128
Spawning and other Habits of Alaska Salmon 9-15
Spawning-ground of Alaska Salmon 11
Spawning-nests of Alaska Salmon 11
Spring Salmon 5
Spuhn & Vanderbilt 121
Statistics of Alaskan Salmon Industry 49-60
Steam Power in Karluk Fisheries 153
Stikine River 105
Stirling, Yates 3
Stone, Livingston 144, 163
Stranger River 128
Streams of Boca de Quadra Region 64
Sturgeon 128
Sukkwan 75, 116
Surge Bay 121, 128
Taku River 126
Tamgass Harbor 68
Tar Stream 73

Page.
Tebenkof Bay 121
Test Kettles 27
Thin Point 171
Thin Point Packing Co 17
Thorne Arm 68
Thorne Bay 100
Tin used for Salmon Cans 33
Togiak 177
Tok-hebe 116
Tongass Narrows 64
Tongass Packing Co 16
Topping Machine 25
Totems 70
Trap at Chignik Lagoon 170
    Killisnoo 122
    Kussilof 41
Trawls 45
Tschavitche 5
Tsimpsean Indians 66
Tuliumnit Point 164
Tustumena Lake 141
Tyee Salmon 3, 5
Tyonek 143
Uganuk 147
Uganuk Bay 160
Uganuk Fishing Station 17
Ugashik Fishing Station 17
Ugashik River 176
Union Bay 103
Uyak Anchorage 158
Uyak Bay 158
Uyak Lake 162
Value of Plants, Number of Employees, and Fishing Apparatus, Alaska Salmon Canneries for 1896, Tabular Statement 56
Value of Plants, Number of Employees, and Fishing Apparatus, Alaska Salmon Canneries for 1897, Tabular Statement 58
Vessels and Boats employed by Alaska Salmon Canneries in 1896, Tabular Statement 57
Vessels and Boats employed by Alaska Salmon Canneries in 1897, Tabular Statement 59
Vixen Bay 62
Vixen Bay Stream 64
Wages in Bering Sea District 177
Ward Cove 65
Warm Chuck 116
Weasel Cove 62
Weight of Salmon 14, 31, 83, 93, 120, 126, 140, 145, 169
Western Alaska Company 17
Whale Passage 106
Williams, Brown & Co 125
Wingham Island 129
Wrangell 103-105
Wrangell Narrows 108
Yakutat 129
Yes Bay 97
Zapora 36, 163